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**REMEDIAL INVESTIGATION REPORT
NEASE SITE, SALEM, OHIO**

VOLUME 5- Appendix N:

**Middle Fork of Little Beaver Creek
(Binder 1 of 3)**

Submitted to:

**U.S. Environmental Protection Agency
Region 5
Chicago, Illinois**

and

**Ohio Environmental Protection Agency
Columbus, Ohio**

Submitted by:

**Ruetgers-Nease Corporation
State College, Pennsylvania**

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May 1996

Project No. 933-6154



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May 24, 1995

Project No.: 933-6158

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RE: NEASE SITE, SALEM, OHIO
REMEDIAL INVESTIGATION REPORT: VOLUME 5
APPENDIX N: MIDDLE FORK OF LITTLE BEAVER CREEK

Dear Sheila and Joe:

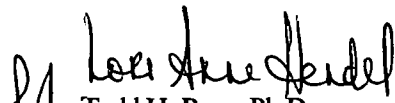
On behalf of Ruetgers-Nease Corporation (RNC), Golder Associates Inc. (Golder) is pleased to forward herewith the Remedial Investigation Report Appendix N: Middle Fork of Little Beaver Creek for the Nease Site, Salem, Ohio. Additionally, please find a Response to Comments Document addressing general and specific comments on the Additional RI Report (MFLBC Investigations) submitted to the Agencies on August 18, 1994 and commented on the Agencies' letter dated February 24, 1995.


Pursuant to a teleconference call on April 3, 1996 and a meeting on April 24, 1996 between the Agencies, RNC and Golder, this report brings together the results of all RI related activities conducted at the Middle Fork of Little Beaver Creek. The main text, tables, and figures summarize all of the data collected in the various studies. Detailed reports of individual studies (which have been previously submitted to the Agencies) are also included as attachments.

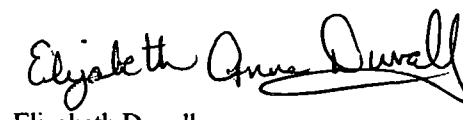
If you have any questions, please call Mr. Ralph Pearce of RNC in the first instance.

Very truly yours,

GOLDER ASSOCIATES INC.


Todd H. Rees, Ph.D.
Project Manager


P. Stephen Finn, C.Eng.
Project Director and Principal


Elizabeth Duvall
Environmental Scientist

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TABLE OF CONTENTS

Binder 1

Cover Letter

Table of Contents i

<u>SECTION</u>	<u>PAGE</u>
----------------	-------------

1.0	INTRODUCTION	1
2.0	MFLBC FLOODPLAIN SOIL AND SEDIMENT INVESTIGATIONS	6
2.1	Phase I Sampling Program.....	6
2.2	Area 2, Phase II, and Egypt Swamp Sampling Program	8
2.2.1	Area 2 Sampling Program.....	8
2.2.2	Phase II Sampling Program	8
2.2.2.1	Phase II Sampling Activities.....	10
2.2.2.2	Phase II Analytical Results	12
2.2.3	Egypt Swamp Sampling Program.....	14
2.3	Phase III Sampling Program	17
2.3.1	Phase III Sampling Activities	18
2.3.2	Analytical Results	20
2.3.3	Habitat Descriptions.....	22
3.0	INDIANA BAT SURVEY	24
4.0	ECOLOGICAL HABITAT INVENTORY AND STREAM SURVEY	27
5.0	CONCLUSIONS.....	29
	REFERENCES.....	32

LIST OF ABBREVIATIONS

LIST OF TABLES

In Order
Following
Page 32

Table 1	Ranges of Discrete Sample Parameters Upstream From Lisbon Dam, MFLBC	
Table 2	Summary of Constituents Detected In Overbank Deposit Soil Samples, MFLBC Phase I	
Table 3	Summary of Volatile Organic Compounds Detected In Sediment Samples, MFLBC Phase I	
Table 4	Maximum and Minimum concentrations of Semivolatile Organics Detected in Sediment Samples, MFLBC Phase I	

TABLE OF CONTENTS (continued)LIST OF TABLES (continued)

Table 5	Mirex and Photomirex Analytical Results For Sediment Samples, MFLBC Phase I
Table 6	MFLBC Overbank Deposit and Sediment Sampling, Mirex\ Photomirex\ Kepone, Total Organic Carbon, & Grain Size Samples, Phase II
Table 6A	Percent Fine Fraction and Total Organic Carbon Content, Area 2, Alternate Area 3 and Area 5, MFLBC Phase II
Table 7	MFLBC Overbank Deposit and Sediment Sampling, Phase II - Location Descriptions
Table 8	Preferred Habitats for Indicator Species
Table 9	MFLBC Floodplain Samples, Associated Habitats and Indicator Species
Table 10	Sampling Across Indicator Species Habitats, Summary of Phase III and Existing MFLBC Floodplain Soil and Sediment Transects
Table 11	Sampling Parameters for Floodplain Transect Stations and Metals Sampling Stations, MFLBC Phase III
Table 11A	USEPA Split Sample Information
Table 12A	Summary of Detected Concentrations, MFLBC Phase III, Floodplain Soils
Table 12B	Summary of Detected Concentrations, MFLBC Phase III, Sediments
Table 13	Analytical Chemistry Results, MFLBC Phase III, TOC and Percent Fines, Floodplain Soils and Sediments
Table 14	Physical Descriptions of Floodplain Soils and Sediments, MFLBC Phase III
Table 15	Descriptions of Habitats Observed in the Vicinity of Sample Locations, MFLBC Phase III
Table 16	Results of 1991 Remedial Investigation, Sediment and Floodplain Soil Sampling Program: Egypt Swamp
Table 17	Results of 1993 Egypt Swamp Soil/Sediment Sampling Program: Mirex, Photomirex, Kepone
Table 18	Results of 1993 Egypt Swamp Soil/Sediment Sampling Program: Total Organic Carbon

LIST OF FIGURES

Figure 1	Schematic Sampling Map for Middle Fork Little Beaver Creek
Figure 2	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 1 of 9)
Figure 3	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 2 of 9)
Figure 4	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 3 of 9)

TABLE OF CONTENTS (continued)

LIST OF FIGURES (continued)

Figure 5	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 4 of 9)
Figure 6	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 5 of 9)
Figure 7	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 6 of 9)
Figure 8	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 7 of 9)
Figure 9	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 8 of 9)
Figure 10	Chemistry and Ecological Information, Middle Fork Little Beaver Creek (Sheet 9 of 9)
Figure 11	Area 2 Sampling Location Plan
Figure 12	Alternate Area 3 Sampling Location Plan
Figure 13	Area 5 Sampling Location Plan
Figure 14	Sediment Sampling For Metals

LIST OF ATTACHMENTS

Attachment N1	Indiana Bat Habitat Survey: Middle Fork Little Beaver Creek, Salem, Ohio
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Binder 2

Attachment N2	Ecological Habitat Inventory and Stream Survey
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Binder 3

Attachment N3	Supplemental Wetland Soil/Sediment Sampling of Egypt Swamp at the Nease Chemical Superfund Site, Salem, Ohio
Attachment N4	Analytical Chemistry Validation Narrative - MFLBC Phase III
Attachment N5	Analytical Chemistry Results Tables - MFLBC Phase III

1.0 INTRODUCTION

Pursuant to an Administrative Order of Consent (AOC) effective February 18, 1988, Ruetgers-Nease Corporation (RNC) performed an investigation of the Middle Fork of Little Beaver Creek (MFLBC) in 1990, including sampling and analysis of surface water, sediment, floodplain soil, and fish tissue from stations along the MFLBC and several of its tributaries. The investigation was conducted in accordance with the approved Remedial Investigation (RI) Work Plan (Revision 4) submitted by RNC on February 28, 1990. The results of the 1990 MFLBC investigations were presented in the Partial RI Report dated April 5, 1991 (and summarized herein in Section 2.1), and were used in conjunction with the results of the U.S. Environmental Protection Agency (USEPA)/Ohio Environmental Protection Agency (OEPA) sampling program performed in August and November 1987 and the OEPA survey of the MFLBC performed in 1985 to determine the need for, and locations of, additional samples downstream from the Nease Chemical Site (Site). The Report of April 5, 1991 was considered to be a partial product because it did not include a remedial investigation or endangerment assessment for the RNC manufacturing site (on-Site areas). The report also contained several data gaps regarding the characterization of contamination in the creek sediments and floodplain soils, and the general characterization and assessment of impacts to the ecological units within the creek itself, creek corridors and Egypt Swamp (off-Site areas).

Pursuant to the additional work provisions of Paragraph XIII of the AOC, RNC recommended in the April 5, 1991, Partial RI Report submittal that further investigations be performed on the MFLBC. A MFLBC Phase II program was developed to sample and analyze stream sediments and overbank deposits in the two particular sections of the creek identified in the 1991 Partial RI (from Station 5 to Station 15 and from Station 19 to Station 30, see Figure 1). The primary goal was to characterize mirex distribution in MFLBC floodplain deposits and sediments in the two sections of the creek. RNC submitted to USEPA and CEPA (the Agencies) a MFLBC Phase II Sampling Plan consistent with these

objectives on October 2, 1992. The Sampling Plan was subsequently revised following USEPA/OEPA correspondence dated January 14, and January 28, 1993, and resubmitted on February 4, 1993. USEPA and OEPA (the Agencies) approved the revised MFLBC Phase II Sampling Plan in a letter dated May 8, 1993.

The MFLBC Phase II fieldwork was conducted by ERM-Midwest (ERM) in May 1993. The results of this Phase II sampling are summarized in Section 2.2.2 of this Appendix. Subsequent to completion of Phase II sampling, ERM prepared statistical analyses of the data and submitted a Statistical Analysis Report to RNC in March 1994. Phase II data, along with ERM's Statistical Analysis Report and a conceptual model for mirex distribution along the MFLBC were provided to the Agencies in the Additional Remedial Investigation Report, MFLBC, Nease Site, Salem, Ohio (Additional RI, Golder Associates, 1994) which was submitted on August 18, 1994. Upon reviewing the Statistical Analysis report and proposed conceptual model for mirex distribution, the Agencies determined that the statistical relationships and conceptual model were too tenuous of a basis for remedial decision-making.

In July 1993, RNC submitted a revised RI Report (Revised RI, RNC, 1993) and Endangerment Assessment (EA) addressing Agency comments on the 1991 Partial RI Report. This report was to be comprehensive, integrating the previous 1990 investigations of the MFLBC (Phase I) together with the more recent studies which characterized the nature and extent of contamination at the Site itself, and Phase II of the MFLBC sampling activities which characterized Mirex, Photomirex, and Kepone (MPK) contamination of the creek sediments and surrounding floodplains. However, at the time of the Revised RI's submission, the Phase II data was still being evaluated by ERM. After a preliminary review of the July 1993 Revised RI, the Agencies noted data gaps that had not previously been addressed by RNC and subsequently requested that three additional fieldwork investigations related to the MFLBC be completed, as follows:

1. A field survey of the MFLBC to assess the presence of habitat potentially suitable for the federally endangered Indiana bat;
2. A field survey of habitat types and biota to provide descriptions of the dominant physical and vegetative features of the MFLBC, its riparian zone, and associated wetlands; and
3. Additional wetland soil and sediment sampling within a discrete portion of the MFLBC, known as Egypt Swamp.

All of these investigations were undertaken during the fall of 1993 and factual reports were subsequently submitted to the Agencies (ENVIRON, 1994a, Eastern States, 1993, and ENVIRON 1994b). The reports are included as Attachments N1, N2, and N3, respectively, to this Appendix and are summarized in Sections 3.0, 4.0, and 2.2.3, respectively, of this Appendix. Tabulated results of these investigations are also included in this Appendix. Wetland areas and other habitat information identified on the Habitat Inventory and Stream Survey figures (Eastern States, 1993) are also presented on Figures 2 through 10 of this Appendix.

The Agencies provided comments on the Phase II study (Additional RI, Golder Associates, 1994) in a letter dated February 24, 1995. The Agencies stated that a more extensive evaluation of the data was needed and that additional sampling of the MFLBC was necessary. In a letter to RNC dated March 21, 1995, the Agencies defined the following goals for additional floodplain soil and sediment sampling of the MFLBC:

- Address critical data gaps in MFLBC floodplain soils¹ and sediment¹ data in the reaches of the creek between RI Stations 5 and 15, and between 19 and 31.
- Within these two reaches, focus sampling on areas which potentially present human health and ecological risks. Design sampling using

¹ Sediment is used to refer to substrate within the creek channel which is generally submerged; the term floodplain soil refers to substrate within the floodplain which is not generally submerged

selected risk scenarios involving human and ecological receptors. Other areas must be characterized but to a lesser degree.

Furthermore, the Agencies also requested that additional sediment samples be collected for metals analyses to determine if Site-related metals are present in sediments.

To fulfill these goals, RNC submitted a Work Plan for Phase III Floodplain Soil and Sediment Sampling of the MFLBC (Phase III Work Plan) in June 1995, that identified ten floodplain transects along which thirty-two discrete soil sample locations were situated. In-stream sediment sample locations were also situated along four of the transects. Eleven additional locations were identified at which sediment samples would be collected for metals analyses only. The Phase III Work Plan was approved by the Agencies on July 5, 1995. On July 31, 1995, with Agency concurrence, the Phase III Work Plan was modified; as a result of difficulties in obtaining an access agreement for a property associated with the original location of transect SS95-26B, the transect was relocated to an area approximately 500 feet south of its original location.

Phase III floodplain soil and sediment sampling of the MFLBC was performed in accordance with the modified Phase III Work Plan in September 1995. Section 2.3 of this Appendix text summarizes the Phase III sampling activities, analytical chemistry results, and sample location habitat descriptions. Figure 1 of this Appendix, the MFLBC schematic sampling map, shows Phase I, II, and III sample locations. Detailed representations of MFLBC sampling locations and associated analytical data for Mirex and Photomirex are shown on Figures 2 through 10 of this report.

The purpose of this appendix to the Final RI Report (Final RI, RNC, 1996) is to provide an integrated presentation of all available results from the various investigations of the MFLBC described above so as to define the nature and extent of Mirex in MFLBC floodplain deposits and sediments. Background information is presented in Section 1.0. Sampling programs and associated results are summarized in Section 2.0. The Indiana bat

Habitat Survey is summarized in Section 3.0, and the Ecological Habitat Inventory and Stream Survey is summarized in Section 4.0. Section 5.0 presents an overview of the Supplemental Wetland Soil/Sediment Sampling Of Egypt Swamp and Section 6.0 summarizes the conclusions of the complete MFLBC RI studies.

2.0 MFLBC FLOODPLAIN SOIL AND SEDIMENT INVESTIGATIONS

As described in Section 1.0, sampling activities associated with the MFLBC were performed in three major phases. These sampling programs are summarized below. The Phase I program is described in Section 2.1. The Area 2 and Phase II programs are described in Section 2.2, and the Phase III program is described in Section 2.3. Table 1 of this Appendix summarizes minimum, maximum, and mean concentrations of Mirex, total organic carbon content (TOC), and percent fines detected during all of the MFLBC sampling events (except the initial 1985 OEPA sampling event, the results of which are unavailable). Figures 2 through 10 present detailed locations for Phase I, II, and III samples, along with Mirex and Photomirex results. In cases where both a primary sample and a field duplicate sample were analyzed for a specific parameter, a conservative approach was taken in that the higher of the two results is reported in all summary tables and figures.

2.1 Phase I Sampling Program

The Phase I sampling was performed in 1990 and involved the collection of twenty-eight overbank (i.e., floodplain) soil samples and fifty-four sediment samples.

During the RI, Phase I samples were identified by the prefix SS91, for overbank deposit soils, or SD91 for sediment, followed by the transect number and, for overbank deposit samples, a suffix (01 through 04) to distinguish each location along the transect. Soil samples were analyzed for Diphenyl sulfone, Methoxychlor, and MPK. Diphenyl sulfone and Methoxychlor were not detected. Mirex was detected in eighteen of twenty-four soil samples. Reported concentrations ranged from not detected to 4540 $\mu\text{g/kg}$, with a mean concentration of 654 $\mu\text{g/kg}$. Photomirex was detected in eleven of twenty-four samples. Reported concentrations ranged from not detected to an estimated maximum concentration of 132 $\mu\text{g/kg}$. The mean concentration of Photomirex in soil was 12 $\mu\text{g/kg}$. Kepone was not detected in Phase I soil samples (see Table 2).

Sediment samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL pesticides, and MPK. VOCs were detected in five of seven samples. Five specific VOCs were detected, two of which may be associated with sources other than the Site. The potentially Site-related constituents, 1,2-Dichloroethane, 1,2-Dichloropropane, and 2-Butanone, were each detected once at low levels (see Table 3).

SVOCs were detected in twenty-seven of thirty-two sediment samples. Twenty-four specific SVOCs were detected. Benzoic acid, detected in two samples, was reported at concentrations ranging from not detected to an estimated maximum concentration of 430 µg/kg. Di-n-butylphthalate, detected in three samples, was reported at concentrations ranging from not detected to an estimated maximum concentration of 74 µg/kg. Diphenyl sulfone, detected in two samples, was reported at concentrations ranging from not detected to an estimated maximum concentration of 170 µg/kg (see Table 4). Of the twenty-one detected SVOCs which are likely to be associated with sources other than the Site, sixteen are Polynuclear Aromatic Hydrocarbons (PAHs).

One TCL pesticide, Heptachlor, was detected in one of twenty-one sediment samples at an estimated concentration of 9.4 µg/kg. The compound was detected in a sample collected upstream from Site and is probably related to sources other than the Site.

Mirex was detected in thirty-six of forty-one sediment samples. Reported concentrations of Mirex ranged from not detected to an estimated maximum concentration of 2820 µg/kg, with a mean concentration of 239 µg/kg. Photomirex was detected in seven of the forty-one sediment samples. Reported concentrations of Photomirex ranged from not detected to an estimated maximum value of 7.38 µg/kg, with a mean concentration of 0.6 µg/kg. Kepone was not detected in Phase I sediment samples (See Table 5).

2.2 Area 2, Phase II, and Egypt Swamp Sampling Programs

In August 1991, OEPA collected soil/sediment samples from the area known as Colonial Villa (CV) mobile home park. This area was subsequently identified as Area 2 and is referred to as such throughout this report. Results are summarized in Section 2.2.1. In May 1993, a second major phase of sampling (Phase II) was performed along the MFLBC by RNC. The Phase II sampling program is described in Section 2.2.2. In November and December 1993, supplemental soil/sediment sampling was performed in the Egypt Swamp in response to Agency requests. This sampling program is summarized in Section 2.2.3 and described in full in the attached document, Supplemental Wetland Soil/Sediment Sampling Of Egypt Swamp At The Nease Chemical Superfund Site, Salem, Ohio (Wetland Soil/Sediment Sampling Report, ENVIRON, 1994b).

2.2.1 Area 2 Sampling Program

In August 1991 fifteen soil samples were collected from Area 2, which is located downstream from the Site on the eastern floodplain of the MFLBC. Samples were analyzed for MPK. Results for Area 2 samples, identified as RNS-SS-09-10 through RNS-SS-09-15 and RNS-SS-09-21 through RNS-SS-09-30, are shown in Table 6 and on Figure 2 of this Appendix.

For Mirex, concentrations ranged from 0.719 $\mu\text{g/kg}$ to an estimated maximum value of 6,650 $\mu\text{g/kg}$, with a mean concentration of 581 $\mu\text{g/kg}$. Photomirex was reported at concentrations ranging from 1 $\mu\text{g/kg}$ to a maximum estimated concentration of 104 $\mu\text{g/kg}$, with a mean concentration of 26 $\mu\text{g/kg}$. Kepone was not detected.

2.2.2 Phase II Sampling Program

The Phase II sampling program was developed to delineate more extensively the distribution of Mirex along the MFLBC. Mirex concentrations were anticipated to exhibit a dependent relationship with the following variables:

1. Soil/sediment organic carbon content;
2. Soil/sediment grain size;
3. Distance and elevation change from the MFLBC (floodplain soils);and
4. Distance from source.

Such relationships have a strong physical basis derived from the properties of Mirex. Because Mirex is virtually insoluble in water but can be adsorbed to fine grained organic-rich sediments, fate and transport of Mirex within the MFLBC is anticipated to be primarily the result of hydraulic transport of fine grained organic rich sediment. Therefore, Mirex concentrations would be expected to be higher in depositional areas, where sediments and floodplain soils have higher fines content and/or organic content. The lateral distribution of Mirex is expected to be limited by the physics of sediment transport, based on elevation changes across the floodplain, which determine the lateral extent of flooding that occurs during large storm events. After a flood event occurs, the floodwater eventually recedes from the most distant, more elevated areas at first and eventually from areas immediately adjacent to the stream. As a result, areas of the floodplain that are situated closer to the creek, and especially areas that are closer to the creek and sloped more gradually, remain inundated by flowing floodwaters for longer periods than distant areas, and possess greater potential to receive sediments settling from receding floodwater. The flow of the floodwater also decreases as the water recedes, potentially resulting in settlement of sediments. Given these factors, it is expected that samples collected from areas closer to the creek would contain more transported sediment, and therefore potentially higher concentrations of Mirex.

Distribution in the downstream direction is also expected to be limited by the physics of sediment transport, based on stream morphology. Areas of sediment deposition along a stream result from changes in stream morphology. When a relatively shallow streambed changes from a rough substrate, such as a rocky area (a riffle area) to a smoother substrate

(a pool area) and turbulence subsides, particulate matter may no longer be held in suspension and may begin to settle out of the water. When the rate of elevational change in the downstream direction diminishes to a much more horizontal slope, flow may decrease sufficiently to result in sediment deposition. When a streambed distinctly changes direction (i.e., when the stream bends or meanders): the rate of flow in the inner portion of the bend is slower. As a result sediment may be deposited on that inner portion of the streambed. The extent of and frequency of riffle/run areas, pool/depositional areas, and meanders, as well as other morphological attributes of the stream, may therefore limit the transport of sediment (and potentially Mirex bound to sediment) in the downstream direction.

To enable evaluation of the anticipated relationships identified above, Phase II samples were collected from three of the five proposed sampling areas of the MFLBC (see Figure 1) and analyzed for TOC and grain size (GS), as well as for analytical chemistry.

2.2.2.1 Phase II Sampling Activities

The approved MFLBC Phase II Program originally consisted of focused floodplain soil and stream sediment sampling at five selected areas designated Area 1, Area 2, Area 3, Area 4, and Area 5 (see Figure 1 of this Appendix and the Middle Fork Little Beaver Creek Sampling Plan, February 4, 1993, pp. 5-6) downstream from the Site and upstream from Lisbon Dam. However, because access issues in three of the five areas were not able to be resolved by RNC, two areas were dropped from the Phase II Program (Areas 1 and 4) and Area 3 was replaced by Alternate Area 3. In a letter dated May 8, 1993, the Agencies concurred with RNC on the substitution of Alternate Area 3 and encouraged RNC to proceed with the sampling of the three areas while continuing to pursue access for Areas 1 and 4.

Floodplain samples were collected from a depth of 0-6 inches, and sediment (in-stream) samples were collected as a composite of three samples taken within a sediment body. In Area 2, ten floodplain soil samples and three sediment samples were collected. In Alternate

Area 3, fifteen floodplain soil samples and five sediment samples were collected. In Area 5, twenty floodplain soil and three sediment samples were collected. Floodplain soil samples were also collected from a depth of 6-12 inches at five locations within Area 2, for vertical profiling of Mirex. Area 2 was selected for this purpose on the basis that samples collected from a depth of 0-6 inches at Area 2 by OEPA in August 1991 had exhibited the highest Mirex levels detected in samples collected from the MFLBC.

Phase II samples were identified by the prefix SS93, for overbank deposit soils, or SD93 for sediment, followed by station number associated with the given area (09 for Area 2, 15 for Alternate Area 3, or 28 for Area 5), and a suffix to distinguish each specific location within the area. All samples were collected using stainless steel utensils (trowels, hand augers, and triers), and were analyzed for MPK, TOC, and GS analyses. Sampling methods were designed to avoid loss of fines from the material, so that an accurate analysis of grain size could be obtained.

Samples also were collected for QA/QC purposes following protocols stated in the Quality Assurance Project Plan (QAPjP) of the RI Work Plan (Volume 2, Q.A.P.P., Section 6.7.1, pp. 89-90). Figures 11, 12, and 13 of this Appendix show the sample points for Area 2, Alternate Area 3, and Area 5, respectively, and the grid system used to select the sample point locations. Sample locations were selected using the unaligned systematic grid procedure of Gilbert (1987). Locations for Phase II soil samples were selected using a method known as "Stratified Systematic Sampling on an Unaligned Grid" (Gilbert, 1987).

In this method, the area of the overbank located perpendicular to a selected length of creek was determined utilizing an AutoCAD system. This area was then subdivided into gridded blocks with the size of the grid determined using the following equation:

$$\left(\frac{A}{N}\right)^{1/2}$$

Where:

A	=	Area of overbank selected
N	=	Number of samples to be taken within the area

For example, if 20 samples were to be taken within an area of 10,000 ft², a grid size of 22.4 feet would be chosen. This grid size creates blocks of 500 ft² for 20 samples in 10,000 ft².

The sampling point within each block was then determined utilizing a table of random numbers. The starting point in the random number table was picked blindly. If the value of the random number was less than or equal to the length of the grid block, the number was deemed valid and selected as the x-value of an (x,y) pair. The next valid number was selected to be the y-value of the (x,y) pair and this then located the sampling point (measured from the northeast corner of the block) within the block.

2.2.2.2 Phase II Analytical Results

Analyses were performed at Midwest Research Institute of Kansas City, Missouri, and validation of the analytical data was performed by Environmental Standards, Inc. of Valley Forge, Pennsylvania.

The Phase II analytical chemistry results, along with TOC and GS results, are presented in Table 6 of this Appendix. In Table 6, results of the grain size analyses are presented as D₁₀, D₃₀, and D₆₀ (μm) size fractions (particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively). In Table 6A, percent fines and TOC results for Phase II samples are presented by sampling area. Physical descriptions of samples are presented in Table 7. A summary of all available MFLBC results for Mirex, TOC, and percent fines is presented in Table 1.

In Area 2, Mirex was detected in nine of ten soil samples analyzed. Concentrations ranged from not detected to 2,870 μg/kg, with a mean concentration of 317 μg/kg. Photomirex, detected in two of the soil samples analyzed, was reported at concentrations ranging from

not detected to 4.64 $\mu\text{g/kg}$, with a mean concentration of 1 $\mu\text{g/kg}$. Kepone was not detected in Area 2 soil samples. TOC in Area 2 soil samples ranged from 13,000 mg-C/kg soil to 51,000 mg-C/kg soil. Percent fines ranged from 42% to 82%.

Mirex was detected in three of three Area 2 sediment samples at concentrations ranging from an estimated of 179 $\mu\text{g/kg}$ to 1,190 $\mu\text{g/kg}$, with a mean concentration of 520 $\mu\text{g/kg}$. Photomirex and Kepone were not detected in Area 2 sediments. Total Organic Carbon in Area 2 sediments ranged from 1,400 mg-C/kg to 4,500 mg-C/kg. Percent fines ranged from approximately 2% to approximately 10%.

In Alternate Area 3, Mirex was detected in fourteen of fifteen soil samples. Reported concentrations ranged from not detected to an estimated maximum concentration of 407 $\mu\text{g/kg}$, with a mean concentration of 68 $\mu\text{g/kg}$. Photomirex was detected in five of the fifteen soil samples. Concentrations ranged from not detected to an estimated maximum concentration of 11.7 $\mu\text{g/kg}$, with a mean concentration of 1.7 $\mu\text{g/kg}$. Kepone was not detected in soil samples in Alternate Area 3. TOC ranged from 10,000 mg-C/kg to 53,000 mg-C/kg soil. Percent fines ranged from 70% to 88%.

Mirex was detected in five of five Alternate Area 3 sediment samples at concentrations ranging from 11.9 $\mu\text{g/kg}$ to an estimated maximum concentration of 37.9 $\mu\text{g/kg}$, with a mean concentration of 24.7 $\mu\text{g/kg}$. Photomirex was detected in only one sediment sample in Alternate Area 3 at a concentration of 1 $\mu\text{g/kg}$. Kepone was not detected in Alternate Area 3 sediment samples. TOC in Alternate Area 3 sediments ranged from 1,000 mg-C/kg to 13,000 mg-C/kg. Percent fines ranged from approximately 5% to approximately 10%.

In Area 5, Mirex was detected in eighteen of twenty soil samples at concentrations ranging from not detected to an estimated maximum concentration of 2,600 $\mu\text{g/kg}$, with a mean concentration of 649 $\mu\text{g/kg}$. Photomirex was detected in thirteen of the twenty soil samples. Concentrations ranged from not detected to 115 $\mu\text{g/kg}$, with a mean concentration

of 24.8 µg/kg. Kepone was not detected in soil samples from Area 5. TOC ranged from 9,200 mg-C/kg soil to 110,000 mg-C/kg soil. Percent fines ranged from 13 to 94%. Most results were between 37% and 94%.

Mirex was detected in three of three Area 5 sediment samples at concentrations ranging from 32.2 µg/kg to an estimated maximum concentration of 223 µg/kg, with a mean concentration of 131 µg/kg. Photomirex was detected in only one of the three sediment samples at an estimated concentration of 1.6 µg/kg. Kepone was not detected in Area 5 sediment samples. TOC in Area 5 sediments ranged from 9,000 to 40,000 mg-C/kg. Percent fines ranged from approximately 25% to approximately 40%.

Overall, the highest Mirex concentrations in each sampling area occur in floodplain soils as opposed to stream sediments. In soil samples collected during Phase II, Mirex was reported at concentrations ranging from not detected to 2,870 µg/kg, with a mean concentration of 575 µg/kg. Photomirex was reported at concentrations ranging from not detected to a maximum of 115 µg/kg, with a mean concentration of 18.8 µg/kg, and Kepone was not detected. TOC ranged from 9,200 mg-C/kg to 110,000 mg-C/kg in soil. Percent fines ranged from 13 % to 94 %. In sediment samples collected during Phase II, Mirex was reported at concentrations ranging from 11.9 µg/kg to 1,190 µg/kg, with a mean concentration of 189 µg/kg. Photomirex was reported at concentrations ranging from not detected to an estimated maximum concentration of 1.6 µg/kg, with a mean concentration of 0.2 µg/kg. Kepone was not detected. TOC ranged from 1,000 mg-C/kg to 40,000 mg-C/kg in sediment. Percent fines ranged from 2% to 40%.

2.2.3 Egypt Swamp Sampling Program

As described in Section 1, the Agencies' comments on the 1993 Revised RI included a request that additional sampling should be performed at Egypt Swamp. In late November and early December of 1993, ENVIRON, in cooperation with USEPA and OEPA personnel, collected nine composite and eight discrete floodplain soil samples from along

the five-mile stretch of the MFLBC known as Egypt Swamp. Figure 1 shows the location of Egypt Swamp in reference to the Site and other sample areas, while Figure 4 of this Appendix shows a detailed map of the Egypt Swamp Area and the locations of all samples collected. Results of the study were reported to the Agencies in a report "Supplemental Wetland Soil/Sediment Sampling of Egypt Swamp at the Nease Chemical Superfund Site, Salem, Ohio" (Supplemental Wetland Soil/Sediment Sampling Report, ENVIRON, 1994b) which was submitted in March 1994, and is included herein as Attachment N3.

Samples were analyzed for TCL SVOCs, TCL pesticides and Polychlorinated biphenyls (PCBs), MPK, TOC, and GS. Two discrete samples were analyzed for TCL volatiles. One composite sample and one discrete sample also were analyzed for Target Analyte List (TAL) metals and cyanide.

Table 16 of this Appendix summarizes the 1991 RI sampling results in Egypt Swamp. Eight discrete floodplain soil samples and eight discrete sediment samples from MFLBC were collected and analyzed for MPK. Mirex in floodplain soils ranged from not detected to 52 µg/kg, with a mean concentration of 12.7 µg/kg. Photomirex and Kepone were not detected in any of the floodplain soil samples. Mirex in sediments ranged from not detected to 403 µg/kg, with a mean concentration of 126 µg/kg. Photomirex was not detected in six of eight 1991 Egypt Swamp sediment samples. The maximum detected concentration of Photomirex in sediment was 2.96 µg/kg, with a mean concentration of 0.4 µg/kg. Kepone was not detected in sediment samples.

Table 17 of this Appendix summarizes the MPK data for the 1993 Egypt Swamp sampling program. Eight discrete and nine composite samples were collected. Mirex was detected in all seventeen samples at concentrations ranging from an estimated value of 2.9 µg/kg to 4080 µg/kg, with a mean concentration of 357 µg/kg. Photomirex was detected in eight samples. Reported concentrations ranged from not detected to 49.1 µg/kg, with a mean concentration of 4.1 µg/kg. Kepone was detected in three samples. Reported concentrations

ranged from not detected to an estimated value of 56.3 µg/kg, with a mean concentration of 3.9 µg/kg.

One VOC considered to be potentially Site-related was detected in the composite soil sample analyzed. 1,1,2,2-Tetrachloroethane was detected at an estimated concentration of 7 µg/kg. VOCs were not detected in the soil sample analyzed.

In the 1993 soil samples analyzed for SVOCs, twenty-one constituents were detected. Seventeen of the detected SVOCs were PAHs, and most results were estimated values. Six other constituents were detected: Phenol, Dibenzofuran, Diethylphthalate, Carbazole, Di-n-octylphthalate, and Butylbenzylphthalate. Phenol was reported at concentrations ranging from not detected to an estimated maximum concentration of 80 µg/kg. Dibenzofuran was reported at concentrations ranging from not detected to an estimated maximum concentration of 240 µg/kg. Diethylphthalate was detected once at an estimated concentration of 83 µg/kg. Carbazole was reported at concentrations ranging from not detected to an estimated maximum concentration of 660 µg/kg. Di-n-octylphthalate was detected once at an estimated concentration of 66 µg/kg, and Butylbenzylphthalate was detected once at an estimated concentration of 77 µg/kg.

Eleven pesticides were detected in soil samples analyzed for TCL pesticides and PCBs. All of the eleven compounds detected are likely to be from sources other than the Site.

The TOC content of the Egypt Swamp composite and discrete samples (Table 18 of this Appendix) ranged from 36,000 mg-C/kg to 492,000 mg-C/kg.

In samples analyzed for metals, eighteen metals were detected above Contract Required Detection Limits (CRDLs) in the composite sample, and seventeen metals were detected above CRDLs in the discrete sample. Cyanide was not detected in either sample.

2.3 Phase III Sampling Program

As noted in Section 1, in a letter dated March 21, 1995, the Agencies requested additional sampling of the MFLBC and defined the goals of the Phase III sampling program such that selection of sample locations would address data gaps within specified reaches of the MFLBC and focus on areas of potential human health or ecological risk. The Agencies also requested that sampling of sediments for metals analysis be performed.

Two reaches of the MFLBC were identified in the Partial RI as areas needing further study. The identified reaches were between RI Stations 5 and 15 and between RI Stations 19 and 31. To fill these spatial and analytical data gaps, ten transects perpendicular to the creek were selected along these two reaches (see Figure 1). Insets on Figures 2 through 5 show details of Phase III floodplain soil transects and co-located sediment sample locations.

To focus on areas of potential risk to human health, it was assumed that exposure could occur at any accessible location within the floodplain. Therefore, along each floodplain transect, soil sample locations were selected on both sides of the MFLBC at intervals of 50 feet, and, when possible, 250 feet from the creek. As a result of this locating strategy, three locations were selected along each of eight transects, and at transects SS95-12 and SS95-23, four locations were selected along each transect.

To focus on areas of potential ecological risk, floodplain soil transects and associated sediment samples were located in the preferred habitats associated with indicator species that characterize the range of sensitive wildlife receptors potentially using the MFLBC. These species and their preferred habitats are detailed in Table 8 of this Appendix. Table 9 presents the habitats and associated wildlife indicator species corresponding to each sample location. The MFLBC sampling transects encompass a range of habitats for the

wildlife indicator species identified in the Draft Endangerment Assessment, as indicated in Table 10.

As a general strategy, Phase III floodplain soil transects were co-located with existing (Phase I or Phase II) sediment sample locations. Exceptions are transects SS95-08A, SS95-08B, SS95-10, and SS95-12. These four Phase III transects were located in areas not previously sampled, and were co-located with Phase III in-stream sediment samples that were positioned based on the presence of depositional areas within the streambed. These floodplain soil and co-located sediment samples were collected for MPK, TOC, and GS analyses. Along transects SS95-08A, SS95-10, and SS95-12, samples were also collected for SVOC analyses.

Phase III samples were identified by the prefix SS95, for floodplain soil, or SD95 for sediment, followed by the transect number and, for floodplain soil samples, a suffix (01 through 04) to distinguish each location along the transect.

Eleven additional locations were also selected for collection of sediment to be analyzed for TAL metals. Sediment samples selected for metals analysis only were identified by the prefix SD95, followed by an M indicating metals analysis, and a suffix (1 through 11) to distinguish the sample location number (Figure 14).

2.3.1 Phase III Sampling Activities

Exact floodplain soil and sediment sample locations were determined in the field, based on the considerations discussed above. Floodplain soil samples were collected on or near the transect line in the floodplain (loosely defined as being within ten vertical feet of the stream surface) and from material of apparent natural origin that was not submerged. Sediment samples were collected on or near the transect line in depositional areas that were composed of relatively fine-grained materials. If sediments along a transect line

were found to be mainly coarse-grained, other locations in the vicinity were assessed until a more fine-grained material was identified, from which the sample was collected.

During the sampling event, one floodplain soil sample location, SS95-14-01, was moved approximately twenty-five feet along the transect to a wetland depression because its original location was determined to be outside the floodplain. Agency field personnel participated in the relocation of the sample and agreed with the final location. All co-located sediment samples were collected within 20 feet of the corresponding floodplain transects.

Sampling location decisions were conditioned by the intent to obtain data that was representative of the range of conditions across the floodplain to which a human or ecological receptor might be exposed and the range of conditions in stream sediments. All field decisions relating to sample locations were made in consultation with Agency field personnel.

All sampling equipment was decontaminated prior to each use in accordance with procedures outlined in the Phase III Work Plan. Samples were collected with a three-inch stainless steel bucket auger, placed in a stainless steel bowl and homogenized, then placed in appropriate sample containers. Quality assurance samples, including field duplicates and rinsate blanks, were also collected and analyzed. Filled sample containers were placed on ice in an insulated cooler that was then sealed and shipped by overnight courier or hand delivered to Centre Analytical Laboratories, Inc. (CAL) for analysis. Table 11 of this Appendix presents a summary of samples collected, corresponding laboratory identification numbers, dates sampled, and analyses performed.

During Phase III, Agency field personnel collected split samples for MPK and SVOC analyses at several locations, as summarized in Table 11a.

2.3.2 Analytical Results

Table 12 presents a summary of detected concentrations for Phase III samples. The MFLBC Phase III data validation narrative and analytical results tables are included as Attachment N4, and N5, respectively. It is worth noting that for the MFLBC Phase III sampling program, quantitation limits for Mirex, Photomirex, and Kepone were revised under the direction of the Agencies. For Phase III sampling, the laboratory contracted (CAL) differed from previous sampling events. Therefore, a new MDL study was performed, and new quantification limits were developed. The quantitation limits utilized during MFLBC Phase III were 0.79, 1.83, and 10.7 µg/kg, respectively, compared to quantitation limits of 18.5, 20.4, and 68.0 µg/kg, respectively, used during previous events. A summary of TOC results, along with percent fines results obtained from the GS analyses is shown in Table 13. Physical descriptions of the samples recorded during grain size analyses are provided in Table 14.

SVOCs were detected in five of the ten soil samples analyzed. Eight SVOCs were detected. Of the SVOCs detected, Benzoic acid was detected once at an estimated concentration of 290 µg/kg, and Benzo(a)pyrene was detected once at an estimated concentration of 240 µg/kg. Fluoranthene, detected in four samples, was reported at concentrations ranging from not detected to 470 µg/kg. Pyrene, detected in three samples, was reported at concentrations ranging from not detected to 370 µg/kg.

Four additional SVOCs were detected in two floodplain soil samples. Phenanthrene was reported at concentrations ranging from not detected to an estimated maximum concentration of 330 µg/kg. Benzo(a)anthracene was reported at concentrations ranging from not detected to an estimated maximum concentration of 210 µg/kg. Chrysene was reported at concentrations ranging from not detected to an estimated maximum concentration of 250 µg/kg, and Benzo(b)fluoranthene was reported at concentrations ranging from not detected to an estimated maximum concentration of 360 µg/kg. With

the exception of Benzoic acid, SVOCs detected are PAHs, which are not associated with the Site.

Thirty-two MFLBC Phase III floodplain soil samples were analyzed for MPK. Mirex was detected in twenty-three of thirty-two soil samples at concentrations ranging from not detected to 350 $\mu\text{g/kg}$, with a mean concentration of 106 $\mu\text{g/kg}$. Photomirex, detected in sixteen of thirty-two soil samples, was reported at concentrations ranging from not detected to 212 $\mu\text{g/kg}$, with a mean concentration of 26 $\mu\text{g/kg}$. Kepone was detected in thirteen of thirty-two soil samples at concentrations ranging from not detected to 193 $\mu\text{g/kg}$, with a mean concentration of 36 $\mu\text{g/kg}$.

TOC in Phase III floodplain soil samples was reported at concentrations ranging from 600 mg-C/kg soil to 14,600 mg-C/kg soil. Percent fines in floodplain soil samples ranged from 12% to 94%.

SVOCs were not detected in the three MFLBC Phase III sediment samples analyzed. Mirex was detected in two of the four sediment samples analyzed. Reported concentrations ranged from not detected to 344 $\mu\text{g/kg}$, with a mean concentration of 155 $\mu\text{g/kg}$. Photomirex and Kepone were not detected in any of the MFLBC Phase III sediment samples. TOC results for MFLBC Phase III sediment samples ranged from 600 mg-C/kg to 2,000 mg-C/kg. Percent fines ranged from 6% to 11%.

Eleven Phase III sediment samples were collected specifically for metals analyses. Results of these analyses are summarized below and in Table 12b of this Appendix.

Selenium was detected at concentrations above the USEPA CRDL in two samples. Cobalt was detected at concentrations above the CRDL in four samples. The other twenty metals analyzed were detected above CRDLs in all eleven samples.

The maximum concentrations of 19 of the 22 metals detected were reported in samples SD95-M-2, SD95-M-3, and SD95-M-4, which are located upstream from the Site. Three metals, iron, silver, and sodium, were detected at maximum concentrations in sediment samples SD95-M-6, SD95-M-10, and SD95-M-9, respectively.

Iron was detected at concentrations ranging from 7,255 mg/kg to 20,517 mg/kg, which is within the range of concentrations detected in background soils in Ohio (Cox and Colvin, 1995). The maximum detected concentration of iron is also below the maximum background concentration of 30,000 mg/kg iron for U.S. soils (Shacklette and Boerngen, 1984). Silver was reported at concentrations ranging from not detected (in seven samples) to an estimated maximum concentration of 0.31 mg/kg, which is within the range of concentrations in background soils in Ohio (Cox and Colvin, 1995).

Sodium was detected at concentrations ranging from 50 µg/kg to an estimated maximum concentration of 328 mg/kg, which is an order of magnitude below the maximum background concentration of 7,000 mg/kg sodium for U.S. soils (Shacklette and Boerngen, 1984). No separate range of concentrations for sodium is identified in the literature for the state of Ohio.

In summary, maximum concentrations for twenty metals were detected in background sediment samples. Maximum concentrations of iron, silver, and sodium were detected in samples collected downstream from the Site, but at concentrations within or below background concentrations.

2.3.3 Habitat Descriptions

During Phase III, at each sample location, the habitat observed in the vicinity of the location was described in field notes. These descriptions, presented in Table 15, begin with the farthest upstream Phase III sample location, SD95-M-1, and continue downstream through the floodplain soil transects and associated samples (including the

two metals samples co-located with transects), to the farthest downstream Phase III transect SS95-26B.

For the discrete sediment samples SD95-M-1 through SD95-M-9, the geographic location is described and the habitat, beginning with the creek itself, moving to the banks, and ending on the floodplains. Any wildlife observed is noted and any impact to or disruption of the habitat in the vicinity of the sample locations is described.

For the floodplain soil samples along transects and sediment samples co-located with those transects, the geographic location is described, and the general habitat of the entire transect is described, beginning with the creek, moving to the banks and concluding with the floodplain. Following the general description of the each transect, the soil sampled is indicated; and the habitat in the vicinity of each sample location along the transect is described. Any wildlife observed is noted, and any impact to or disruption of the habitat in the vicinity of the sample location is described.

3.0 INDIANA BAT SURVEY

In 1992, Ruetgers-Nease Corporation submitted a draft Endangerment Assessment Report to the Agencies. In subsequent comments, the Agencies suggested that the MFLBC was within the general geographic range of the federally endangered Indiana bat (*Myotis sodalis*) and that the species should be addressed in the revised ecological risk assessment. The revised RI and Endangerment Assessment, submitted in July 1993, recommended that the MFLBC be surveyed for habitat that could be potentially suitable to the bat. There are no available data to confirm the current or historical use of MFLBC by the Indiana bat and the survey was not designed to provide that information. The survey, which was conducted in October 1993, was intended to confirm or discount the presence of potentially suitable habitat for the Indiana bat. Full details of the study and the results obtained were reported to the Agencies in February 1994 (ENVIRON, 1994a) and are included here as Attachment N1.

While there are no available data to explicitly confirm the use of MFLBC by the Indiana bat, the habitat suitability evaluation confirmed the presence of potentially suitable habitat in the study area. Much of the 31-mile stretch of MFLBC that was surveyed did exhibit characteristics consistent with the foraging and nursery habitat reported in the literature for the Indiana bat. Exceptions included an area upstream of State Route 45 (Reach 2) and the Franklin Square area (Reach 4) where stream canopy cover was lacking, and below State Route 30 near the town of Lisbon (Reach 7) where the area is industrialized. In addition, six of the eleven MFLBC tributaries that were surveyed exhibited suitable characteristics to consider them as potential Indiana bat habitat. The OEPA benthic macroinvertebrate data suggest that the MFLBC could potentially provide a base of emergent insect prey if, in fact, the Indiana bat was to inhabit this area.

The survey results are qualitative; Figure 1 of Attachment N1 depicts areas along MFLBC that could be considered either potentially suitable or unsuitable habitat.

Quantification of the areal extent of potential habitat was not the objective of the survey, nor can the results be used to infer such (i.e., the hatched areas on the map represent distance along the length of MFLBC but not the distance perpendicular to the stream channel).

As follow up, in an attempt to address the question of whether the Indiana bat is using the habitat adjacent to MFLBC, ENVIRON contacted Ohio and Pennsylvania agencies to determine if there have been reported sightings of the bat in the counties surrounding Columbiana and Mahoning Counties in Ohio. The 1993 EA reported that the Ohio Department of Natural Resources (ODNR) Natural Heritage Data Services did not list the Indiana bat as having been sighted in Columbiana and Mahoning Counties where the Site is located. The results of the contacts made in February 1994 are as follows:

- Contact: Debra Woischke, ODNR, Division of Natural Areas and Preserves. At ENVIRON's request, ODNR files were reviewed for records of Indiana bat sightings in Columbiana, Mahoning, and surrounding Ohio counties. The nearest reported sightings are in Hocking County in southcentral Ohio (over 100 miles from the MFLBC study area). The most concentrated sightings have been in southwest Ohio.
- Contact: Gerry Haffinger, Pennsylvania Game Commission. Mr. Haffinger was unaware of any sightings of the Indiana bat in the Western Pennsylvania counties of Mercer, Lawrence, Beaver, or Washington within the past ten years. He suggested contacting Pennsylvania Natural Diversity Inventory (PNDI) for a review of historical sightings.
- Contact: Kathy McCenna, PNDI. Ms. McCenna reviewed the Natural Heritage database and distribution maps and found no historical sightings of the Indiana bat in Mercer, Lawrence, Beaver, and Washington counties.

Finally, the "Recovery Plan for the Indiana Bat" (U.S. Fish and Wildlife Service, 1983) does not identify any "critical habitats" for the Indiana bat in Ohio. Although the Recovery Plan map of "Known and Suspected Range of Indiana Bat" shades the entire state of Ohio, the available published studies (e.g., Hall 1962) identify only areas in southern and central Ohio where these Bats have been sighted historically. The outer boundary of the range

appears, therefore, to be drawn somewhat arbitrarily and should not be used to establish the presence or use by the Indiana bat in non-critical areas.

In conclusion, based on the available information, although there is potentially suitable foraging and nesting habitat in the MFLBC study area, the available information indicates that it is possible, but not probable that the Indiana bat inhabits this part of Ohio.

4.0 ECOLOGICAL HABITAT INVENTORY AND STREAM SURVEY

The Ecological Habitat Inventory and Stream Survey was conducted over the period October 15-26, 1993, and comprised a field survey of habitats and biota along the MFLBC from the Nease Site to the confluence of the West Fork of Little Beaver Creek with the MFLBC. The study area was divided into 18 stream stretches based on road crossings. The physical habitat of the stream was described at 92 "stream survey points" and the dominant vegetation was described at 196 "habitat description points" along the MFLBC. Major habitat types and vegetation were noted on study area maps. Wetlands were compared to National Wetland Inventory maps, and the present extent of wetlands were shaded on the study area maps. An accompanying list was compiled for birds, mammals, reptiles, and amphibians that were observed during the survey. The full report of the survey is included as Attachment N2.

There were two primary goals for the survey. The first was to provide a more comprehensive description of the dominant physical and vegetative features of the study area (e.g., location and types of wetlands, dominant vegetation, and depositional areas in the stream). At the request of the Agencies, maps have been subsequently prepared which include both the MFLBC habitats and the chemical monitoring data. Figures 2 through 7 of this report present the approximate extent of wetlands adjacent to the MFLBC, habitat description points and stream survey points, and chemical monitoring data.

The second goal of the survey was to record the presence of animals observed in the study area. The list of observed species could then be compared to the lists of species potentially inhabiting the study area based on published literature.

Attachment N2 includes tables of observed species which identify several wildlife species that were observed during the survey but were not anticipated from the published

literature, including the great egret, the common pintail, the white-throated sparrow, the yellow-rumped warbler, and the river otter. In previous draft risk assessment analyses undertaken in 1993, these observed species were represented by receptor species which included the heron, kingfisher, sora, rail, robin, harrier, fox and mink. Five of the receptor species were observed during the field survey, however, no threatened or endangered species were observed.

5.0 CONCLUSIONS

In this Appendix, the results of various studies and sampling programs performed along the MFLBC are summarized. Taking into account all of the available data collected upstream from Lisbon Dam (124 samples), Mirex concentrations in floodplain soils range from non-detect to 6650 $\mu\text{g/kg}$, with a mean of 317 $\mu\text{g/kg}$. Mirex concentrations in sediment (70 samples) range from non-detect to an estimated value of 2,820 $\mu\text{g/kg}$, with a mean of 198 $\mu\text{g/kg}$. The highest Mirex concentrations in each area occur in floodplain soils as opposed to stream sediments.

Based on Mirex results from the five locations in Area 2 where samples were recovered from different depth intervals during the Area 2 and Phase II sampling programs, Mirex concentrations were found to be highest in surface soils. Overall, Mirex concentrations in floodplain soil and sediment samples collected along the MFLBC are highest in the reach of MFLBC between RI Stations 09 and 14.

Photomirex, a degradation product of Mirex, was detected in 66 of 116 soil samples analyzed and 9 of 56 sediment samples analyzed. In all cases, Photomirex was detected at much lower levels than Mirex in the corresponding samples; in almost all cases, Photomirex levels were an order of magnitude lower than the corresponding Mirex levels. Kepone was detected in 13 of 105 soil samples at concentrations ranging up to 193 $\mu\text{g/kg}$.

During Phase III, eleven sediment samples were collected for metals analyses. Maximum concentrations for twenty of the twenty-three metals analyzed were detected in sediment samples at locations upstream from the Site. The maximum concentrations of the remaining three metals, iron, silver, and sodium, were detected in samples collected downstream from the Site, but at concentrations within or below background concentrations.

Analysis of VOCs in soils indicated the presence of only one compound that may be Site-related, 1,1,2,2-Tetrachloroethane, reported once at an estimated concentration of 7 $\mu\text{g/kg}$. Analyses of VOCs in sediments indicated the presence of only three compounds that may be Site-related. 1,2-Dichloroethane was detected once at an estimated concentration of 2 $\mu\text{g/kg}$. 1,2-Dichloropropane was detected once at a concentration of 18 $\mu\text{g/kg}$, and 2-Butanone was detected once at an estimated concentration of 10 $\mu\text{g/kg}$.

Analyses of SVOCs in soils indicated the presence of six compounds that may be Site-related: Phenol, Dibenzofuran, Diethylphthalate, Carbazole, Di-n-octylphthalate, and Butylbenzylphthalate. Phenol was reported at concentrations ranging from not detected to an estimated maximum concentration of 80 $\mu\text{g/kg}$. Dibenzofuran was reported at concentrations ranging from not detected to an estimated maximum concentration of 240 $\mu\text{g/kg}$. Diethylphthalate was detected once at an estimated concentration of 83 $\mu\text{g/kg}$. Carbazole was reported at concentrations ranging from not detected to an estimated maximum concentration of 660 $\mu\text{g/kg}$. Di-n-octylphthalate was detected once at an estimated concentration of 66 $\mu\text{g/kg}$, and Butylbenzylphthalate was detected once at an estimated concentration of 77 $\mu\text{g/kg}$.

Analyses of SVOCs in sediments indicated the presence of only three compounds that may be Site-related: Benzoic acid, Di-n-butylphthalate, and Diphenyl sulfone. Concentrations of Benzoic acid ranged from not detected to an estimated concentration of 430 $\mu\text{g/kg}$. Reported concentrations of Di-n-butylphthalate ranged from not detected to 74 $\mu\text{g/kg}$, and reported concentrations of Diphenyl sulfone ranged from not detected to 170 $\mu\text{g/kg}$.

Analyses of pesticides in soils indicated the presence of eleven compounds. All of the eleven compounds are considered to be from sources other than the Site. Pesticides were not detected in sediments.

The Indiana Bat Habitat Survey determined that although no available data exists to explicitly confirm the use of the MFLBC by the Indiana bat, potentially suitable habitat exists in the area. Further research on sighting information indicated that the Indiana bat has not been sighted in the area and published studies examined do not identify the MFLBC as being part of the Indiana Bat's habitat range. Based on the available information, although there is potentially suitable foraging and nesting habitat in the MFLBC area, the Indiana bat should not be considered as a receptor species.

The Habitat Inventory and Stream Survey performed in 1993 indicated that appropriate receptor species were selected in the 1993 EA for consideration of potential dietary exposures and for completion of an analysis of potential risks from Mirex and Photomirex.

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LIST OF ABBREVIATIONS

AOC	Administrative Order of Consent
CAL	Centre Analytical Laboratories, Inc.
CRDL	Contract Required Detection Limit
EA	Endangerment Assessment
ERM	Environmental Resource Management Inc.
GS	Grain Size
MFLBC	Middle Fork of Little Beaver Creek
MPK	Mirex, Photomirex, and Kepone
OEPA	Ohio Environmental Protection Agency
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
RNC	Ruetgers-Nease Corporation
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon Content
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
µg/kg	Micrograms per kilogram
mg-C/kg	Milligrams carbon per kilogram

TABLE 1
RANGES OF DISCRETE SAMPLE PARAMETERS UPSTREAM FROM LISBON DAM
MFLBC
Nease Site, Salem, Ohio

PARAMETER SAMPLING EVENT	SAMPLE SIZE	MINIMUM	MAXIMUM	MEAN
<u>Floodplain Soil Mirex (ug/kg)</u>				
1991 RI	24	ND (6)	4,540	654
1993 Phase II (including Area 2)	60	ND (4)	6,650	432
1993 Egypt Swamp	17	2 9	4080	357
1995 Phase III	32	ND (9)	350	106
Combined Results	133	ND (19)	6,650	387
<u>Stream Sediment Mirex (ug/kg)</u>				
1987 USEPA/OEPA	14	ND (7)	1,500	205
1991 RI	41	ND (5)	2,820	239
1993 Phase II	11	11.9	1,190	189
1995 Phase III	4	ND (2)	344	155
Combined Results	70	ND (14)	2,820	197
<u>Floodplain Soil TOC (mg-C/kg-Soil)</u>				
1993 Phase II (including Area 2)	60	9,200	110,000	29,337
1993 Egypt Swamp	17	36,000	492,000	110,765
1995 Phase III	32	600	14,600	4,638
Combined Results	109	600	492,000	48,246
<u>Stream Sediment TOC (mg-C/kg-Sediment)</u>				
1993 Phase II	11	1,000	40,000	8,554
1995 Phase III	4	600	2,000	1,050
Combined Results	15	600	40,000	4,802
<u>Floodplain Soil Fines (%<63 um)</u>				
1993 Phase II (including Area 2)	60	13	94	69
1993 Egypt Swamp	17	59	88	71
1995 Phase III	32	12	94	70
Combined Results	109	12	94	70
<u>Stream Sediment Fines (%<63 um)</u>				
1993 Phase II	11	2	40	16
1995 Phase III	4	6	11	8
Combined Results	15	2	40	12

NOTES

1. All samples collected upstream from Lisbon Dam. Mirex was detected in one of four overbank deposit soil samples collected downstream from Lisbon Dam at an estimated maximum concentration of 10.1 µg/kg. Mirex was detected in three of thirteen sediment samples collected downstream from Lisbon Dam at an estimated maximum concentration of 10.9 µg/kg.
2. The column heading Sample Size indicates the number of samples collected upstream from Lisbon Dam during the indicated sampling event.
3. If a field duplicate sample was collected at a given location, the primary result and the field duplicate result were compared and the higher of the two results was used to represent the given sample point in summarizing the data.
4. ND(6): not detected, with number of no-detects in sample base in parentheses.
5. TOC: Total Organic Carbon. TOC and Grain Size Distribution (from which "Fines" are determined) have been analyzed only during events occurring since 1991.
6. 1987 analyses by Full Scan GC/MS, all subsequent analyses by PPNCI, Version 4.1.

REFERENCES:

- 1987 USEPA/OEPA: Quality Assurance Review, Ruetgers-Nease Chemical Company, Environmental Standards, Inc., January 1989.
- 1991 RI. Remedial Investigation Report, July 1993, Ruetgers-Nease Corporation.
- 1993 Phase II. MFLBC Statistical Analysis Report, March 1994, ERM-Midwest, Inc.
Area 2 - OEPA soil sampling at Colonial Villa in August 1991.
- 1993 Egypt Swamp: Supplemental Wetland Soil/Sediment Sampling of Egypt Swamp at the Nease Chemical Superfund Site, Salem, Ohio, ENVIRON Corp., March 1994.
- 1995 Phase III. Remedial Investigation, Appendix N, Golder Associates Inc., May 1996.

TABLE 2
Summary of Constituents
Detected in Overbank Deposit Soil Samples
MFLBC Phase I

(All concentrations are in µg/kg)

Sample ID	10-01	10-02	10-03	10-04	12-01	12-02	12-03	12-04	17-01	17-02
Compounds										
Photomirex	29.8 J	4 J	5.2 J	13.3 J	132 J	3.99 J	20.6 J	33.9 J	-	-
Mirex	3040	656	321 J	896	4540	153	1590	1370 J	16.4 J	62.3

Sample ID	17-03	17-04	19A-04	19B-01	19B-02	27-01	27-02	27-03	43-03	SS-71
Compounds										
Photomirex	22.3 J	-	-	-	-	2.5 J	-	20.8 J	-	-
Mirex	1570	24	25.4 J	52	23.9	32.6	609	715	10.1 J	1380 J

J: Quantitation is approximate due to limitations identified during the quality control review.

- Not Detected

For detailed chemistry results, refer to Appendix K.

Sample Identification Number indicates the surface soil (SS) station by number, followed by the sample number.

TABLE 3
Summary of Volatile Organic Compounds Detected in Sediment Samples
MFLBC Phase I
Nease Site, Salem, Ohio
 (All concentrations are in µg/kg)

Sample ID	SD-01	SD-65 Dup. of SD-01	SD-02	SD-04	SD-05	SD-6C
Volatiles						
Acetone	69 J	49	54 J	27 J	80 J	57
1,2 Dichloroethane	-	-	-	-	2J	-
2-Butanone	-	-	-	-	-	10 J
1,2 Dichloropropane	-	-	-	-	18	-
Toluene	29 J	6 J	-	-	-	-

Qualifier Codes:

J: Quantitation is approximate due to limitations identified during the quality control review (data validation).

- Not detected

For detailed chemistry results, refer to Appendix K.

TABLE 4
Maximum and Minimum Concentrations
of Semivolatile Organics Detected In Sediment Samples
MFLBC Phase I
Nease Site, Salem, Ohio
 (All concentrations are in µg/kg)

Semivolatiles	DETECTION FREQUENCY		CONCENTRATION RANGE	
	# Detections	Total # Samples	Minimum	Maximum
4-Methylphenol	9	32	-	2800
Benzoic Acid	2	32	-	430 J
Naphthalene	5	32	-	140 J
2-Methylnaphthalene	7	32	-	100 J
Phenanthrene	24	32	-	1800
Anthracene	3	32	-	340 J
Di-n-Butylphthalate	3	32	-	74 J
Fluoranthene	24	32	-	1100
Pyrene	21	32	-	790
Butylbenzylphthalate	2	32	-	170 J
Benzo(a)Anthracene	15	32	-	480
Chrysene	20	32	-	530
Phenol	2	32	-	160 J
bis(2-Ethylhexyl)Phthalate	12	32	-	1800
Benzo(b)Fluoranthene	22	32	-	920 J
Benzo(k)Fluoranthene	22	32	-	920 J
Benzo(a)Pyrene	19	32	-	390 J
Indeno(1,2,3-cd)Pyrene	10	32	-	200 J
Benzo(g,h,i)Perylene	10	32	-	230 J
Diphenyl Sulfone	2	60	-	170 J
Dibenzo(a,h)Anthracene	1	32	-	150 J
Acenaphthalene	1	32	-	100 J
Dibenzofuran	1	32	-	180 J
Fluorene	1	32	-	230 J

Qualifier Codes:

- J: Quantitation is approximate due to limitations identified during the quality control review (data validation).
 - Not detected

For detailed chemistry results, refer to Appendix K.

TABLE 5
Mirex and Photomirex Analytical Results For Sediment Samples
MFLBC Phase I
Nease Site, Salem, Ohio
 (All concentrations are in µg/kg)

Sample Concentrations
Upstream Lisbon Dam

Sample #	Mirex	Photomirex	Sample #	Mirex	Photomirex
SD-01	-	-	SD-26	181	-
SD-65	7.84 J	-	SD-27	158	-
SD-02	4.26 J	-	SD-28	100 J	-
SD-03	-	-	SD-29	-	-
SD-04	-	-	SD-30	102 J	-
SD-05	150	5.75 J	SD-31	41.5	-
SD-6A	71.5	-	SD-32	33.7	-
SD-6B	21.5	-	SD-33	78.5	-
SD-6C	87.8	-	SD-34	18.5 J	-
SD-6D	124	-	SD-35	-	-
SD-07	251	-	SD-37	24.1 J	-
SD-10	1680	7.38 J	SD-38	58.8	-
SD-11	527	-	SD-39	-	-
SD-12	423 J	-	SD-64	21.8 J	-
SD-70	2820 J	-	Downstream Lisbon Dam		
SD-13	555	3.09 J	SD-40	-	-
SD-14	1200 J	2.34 J	SD-41	-	-
SD-15	150 J	2.58 J	SD-42	10.5 J	-
SD-16	34.6	-	SD-43	-	-
SD-17	42.1 J	-	SD-66	R	R
SD-69	76.7 J	-	SD-44	6.30 J	-
SD-17-02	62.3	-	SD-45	10.9 J	-
SD-18	57.5	-	SD-46	-	-
SD-19	125	-	SD-47	-	-
SD-19A	-	-	SD-48	-	-
SD-19B	93.7 J	-	SD-49	-	-
SD-20	403 J	-	SD-63	-	-
SD-21	45.5	0.479 J	SD-50	-	-
SD-22	175 J	-	SD-51	-	-
SD-23	107	2.96 J	SD-52	-	-
SD-24	127	-			
SD-25	75.3	-			

Maximum and Minimum Concentrations

	Upstream Lisbon Dam	
	Mirex	Photomirex
# Detections	39	7
Total # Samples	46	46
Max. Concentration	2820 J	7.38 J
Min. Concentration	-	-

	Downstream Lisbon Dam	
	Mirex	Photomirex
# Detections	3	-
Total # Samples	15	15
Max. Concentration	10.9 J	-
Min. Concentration	-	-

Qualifier Codes:

J: Quantitation is approximate due to limitations identified during the quality control review (data validation).

- Not detected

R Unreliable result—analyte may or may not be present in this sample.

Mirex minimum reporting limit: 18.5 µg/kg

Photomirex minimum limit: 20.4 µg/kg

Kepon was not detected in any MFLBC sediment sample.

Duplicate Samples: SD-65 = SD-01

SD-70 = SD-12

SD-69 = SD-17

SD-64 = SD-39

SD-66 = SD-43

SD-63 = SD-49

For detailed chemistry results, refer to Appendix K.

TABLE 6

Rutgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon, & Grainsize Samples (1)

Northing	Easting	Elevation	Area	Sample Number	Sur. Num	Other Desig.	Mirex ug/kg	Photo M ug/kg	Kepona ug/kg	TOC mg/kg	D10 um	D30 um	D60 um	Sample Depth	QA/QC Sample
468879.440	2446636.259	1103.11	2	RNS-SS-09-01	SL-1		54.2			24000	0.61	9.0	70	(0-6")	
468976.563	2447090.267	1102.79	2	RNS-SS-09-02	SL-5		17.3			26000	0.68	8.8	36	(0-6")	
469125.436	2446642.301	1101.80	2	RNS-SS-09-03	SL-7		10.2			13000	0.18	10.0	51	(0-6")	
469228.998	2446985.305	1101.26	2	RNS-SS-09-04	SL-8		48.7	4.64		14000	0.75	23.0	128	(0-6")	
469335.432	2446662.343	1101.87	2	RNS-SS-09-05	SL-17					20000	0.10	4.8	30	(0-6")	
469336.993	2446986.348	1101.35	2	RNS-SS-09-06	SL-18		29.2			17000	2.00	41.0	150	(0-6")	
469377.555	2447194.350	1100.66	2	RNS-SS-09-07	SL-19		18.5			25000	2.00	30.0	110	(0-6")	
469398.677	2447580.357	1099.44	2	RNS-SS-09-08	SL-24		2870			13000	1.50	35.0	120	(0-6")	
469685.112	2447316.395	1111.65	2	RNS-SS-09-09	SL-26		28.9			21000	0.73	17.5	75	(0-6")	
469544.673	2447601.399	1099.76	2	RNS-SS-09-10	SL-25		74	3.29		17000	2.30	21.0	63	(0-6")	
469024.217	2446874.804	1101.70	2	RNS-SS-09-11	SL-6	CV-1	958*	58*	*	27000	3.00	36.0	175	(0-6")	
469236.322	2447398.319	1099.16	2	RNS-SS-09-12	SL-15	CV-11	655*	94*	*	24000	1.50	9.3	32	(0-6")	
469241.107	2447470.445	1100.05	2	RNS-SS-09-13	SL-16	CV-13	42.1*	4*	*	26000	1.90	11.0	43	(0-6")	
469264.572	2447386.316	1098.90	2	RNS-SS-09-14	SL-20	CV-10	6850*	104*	*	18000	2.50	16.8	57	(0-6")	
469280.009	2447449.070	1099.59	2	RNS-SS-09-15	SL-21	CV-12	301*	46*	*	18000	1.40	14.0	57	(0-6")	
469024.217	2446874.804	1101.70	2	RNS-SS-09-16	SL-6	CV-1	41.3	2.41		15000	3.60	73.0	305	(6-12")	
469236.322	2447398.319	1099.16	2	RNS-SS-09-17	SL-15	CV-11	342	21.2		15000	0.17	7.1	45	(6-12")	
469241.107	2447470.445	1100.05	2	RNS-SS-09-18	SL-16	CV-13	24.1	2.33		26000	0.61	9.8	44	(6-12")	

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

(2) "*" Result of sample collected at Colonial Villa by OEPA in August 1991. If no value accompanies asterisk, result was considered either not detected or unusable.

(3) Columns bearing headings D10, D30, and D60 um indicate particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively.

(4) Validation qualifiers are not shown. See Figures 2,3, and 5 of Appendix N.

TABLE 6

Ruelgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon, & Grainsize Samples (1)

Northing	Easting	Elevation	Area	Sample Number	Sur. Num	Other Desig.	Mirex ug/kg	Photo M ug/kg	Kepona ug/kg	TOC mg/kg	D10 um	D30 um	D60 um	Sample Depth	QA/QC Samples
469264.572	2447386.316	1098.90	2	RNS-SS-09-19	SL-20	CV-10	3740	129	30.7	17000	0.14	11.0	55	(6-12")	
469280.009	2447449.070	1099.59	2	RNS-SS-09-20	SL-21	CV-12	223			15000	0.41	8.2	40	(6-12")	
468846.691	2446918.817	1104.89	2	RNS-SS-09-21	SL-2	CV-3	1.74*	.	.	32000	1.60	25.0	70	(0-6")	
468981.996	2446885.018	1102.43	2	RNS-SS-09-22	SL-4	CV-2	17.7*	2*	.	30000	4.80	38.0	165	(0-6")	
468897.401	2447182.891	1102.37	2	RNS-SS-09-23	SL-3	CV-6	10.8*	1*	.	51000	0.50	7.4	37	(0-6")	
469044.439	2447122.031	1101.67	2	RNS-SS-09-24	SL-11	CV-5	13.3*	1*	.	30000	1.00	8.0	28	(0-6")	
469106.496	2447098.025	1100.50	2	RNS-SS-09-25	SL-10	CV-4	28.4*	1*	.	28000	1.50	11.0	50	(0-6")	
469148.022	2447250.173	1101.52	2	RNS-SS-09-26	SL-13	CV-8	15.2*	1*	.	20000	3.60	19.8	66	(0-6")	
469198.270	2447230.483	1101.15	2	RNS-SS-09-27	SL-12	CV-7	19*	2*	.	20000	3.40	26.0	74	(0-6")	
469041.815	2447294.290	1106.06	2	RNS-SS-09-28	SL-14	CV-9	0.719*	.	.	24000	4.00	19.5	69	(0-6")	
469264.572	2447592.584	1102.50	2	RNS-SS-09-29	SL-22	CV-15	1.99*	.	.	26000	0.40	9.0	59	(0-6")	
469331.569	2447555.626	1100.70	2	RNS-SS-09-30	SL-23	CV-14	4.42*	1*	.	24000	1.00	13.0	69	(0-6")	
468879.440	2446636.259	1103.11	2	RNS-SS-09-31	SL-1		76			32000	1.00	20.0	70	(0-6")	DUP SS-09-01
475433.616	2459610.772	1042.48	AR.3	RNS-SS-15-01	SL-3		24.2	1.46		36000	0.10	4.0	19	(0-6")	SS-15-01-113 FB
475180.616	2460002.772	1042.49	AR.3	RNS-SS-15-02	SL-2		27.6	3.16		41000	0.66	7.0	25	(0-6")	MS/MSD
475144.616	2460382.722	1038.17	AR.3	RNS-SS-15-03	SL-1		57.2			30000	0.10	5.0	39	(0-6")	
475744.616	2459486.772	1044.24	AR.3	RNS-SS-15-04	SL-6		4.19			14000	0.51	8.9	33	(0-6")	
475450.616	2459583.772	1042.70	AR.3	RNS-SS-15-05	SL-4		8.9	1.1		33000	0.10	2.9	19	(0-6")	

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

(2) *** Result of sample collected at Colonial Villa by OEPA in August 1991. If no value accompanies asterisk, result was considered either not detected or unusable.

(3) Columns bearing headings D10, D30, and D60 um indicate particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively.

(4) Validation qualifiers are not shown. See Figures 2,3, and 5 of Appendix N.

TABLE 6

Rutgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepone, Total Organic Carbon, & Grainsize Samples (1)

Northing	Easting	Elevation	Area	Sample Number	Sur. Num	Other Desq.	Mirex ug/kg	Photo M ug/kg	Kepone ug/kg	TOC mg/kg	D10 um	D30 um	D60 um	Sample Depth	QA/QC Sample
475694.616	2460252.772	1043.57	AR.3	RNS-SS-15-06	SL-5		23.2			23000	0.01	6.8	30	(0-6")	
476205.616	2459338.772	1044.21	AR.3	RNS-SS-15-07	SL-9		320	8.1		18000	0.25	13.1	50	(0-6")	
476124.616	2459597.772	1043.81	AR.3	RNS-SS-15-08	SL-8		23.3			18000	0.45	9.5	40	(0-6")	
476060.616	2459952.772	1042.73	AR.3	RNS-SS-15-09	SL-7		25.8			10000	0.35	10.5	44	(0-6")	
476629.616	2459346.772	1043.93	AR.3	RNS-SS-15-10	SL-15		407	11.7		24000	0.72	6.3	45	(0-6")	
476451.616	2459940.772	1043.72	AR.3	RNS-SS-15-11	SL-11		26.7			18000	0.12	4.0	17	(0-6")	
476346.616	2459965.772	1043.15	AR.3	RNS-SS-15-12	SL-10		41.1			18000	0.55	5.2	21	(0-6")	
476783.616	2459349.772	1045.72	AR.3	RNS-SS-15-13	SL-14		15.9			53000	0.52	7.0	27	(0-6")	
476738.616	2459944.772	1043.26	AR.3	RNS-SS-15-14	SL-13		11.6			22000	0.38	3.7	17	(0-6")	
476921.616	2460035.772	1046.14	AR.3	RNS-SS-15-15	SL-12					16000	0.68	5.8	27	(0-6")	
475180.616	2460002.772	1042.49	AR.3	RNS-SS-15-16	SL-2		33.2			32000	0.40	7.0	21	(0-6")	DUP SS-15-02
476346.616	2459965.772	1043.15	AR.3	RNS-SS-15-17	SL-10		37.9			20000	0.60	5.5	20	(0-6")	DUP SS-15-12
440783.173	2472722.075	1007.23	5	RNS-SS-28-01	SL-1		105			9200	50.00	150.0	250	(0-6")	SS-28-01-114 FB
441013.873	2472679.075	999.49	5	RNS-SS-28-02	SL-2		2600	13.5		42000	0.05	2.1	15	(0-6")	
441044.873	2472864.775	999.42	5	RNS-SS-28-03	SL-3		270			18000	2.00	32.0	165	(0-6")	
441480.273	2472583.375	1010.44	5	RNS-SS-28-04	SL-4					49000	5.50	30.0	250	(0-6")	
441393.273	2472839.075	1000.92	5	RNS-SS-28-05	SL-5		336	24.9		48000	0.32	4.1	21	(0-6")	
441424.273	2472925.775	1000.30	5	RNS-SS-28-06	SL-6		1360	2.48		37000	0.40	1.9	11	(0-6")	MS/MSD

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

(2) *** Result of sample collected at Colonial Villa by OEPA in August 1991. If no value accompanies asterisk, result was considered either not detected or unusable.

(3) Columns bearing headings D10, D30, and D60 um indicate particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively.

(4) Validation qualifiers are not shown. See Figures 2.3, and 5 of Appendix N.

TABLE 6.
Ruetgers-Nease Corporation
MFLBC Overbank Deposit and Sediment Sampling, Phase II
Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon, & Grainsize Samples (1)

Northing	Easting	Elevation	Area	Sample Number	Sur. Num	Other Desig.	Mirex ug/kg	Photo M ug/kg	Kepona ug/kg	TOC mg/kg	D10 um	D30 um	D60 um	Sample Depth	QA/QC Sample
441678.973	2472682.075	1007.37	5	RNS-SS-28-07	SL-7		6.5			33000	2.60	36.0	242	(0-6")	SS-28-16-115 FB
441575.973	2472925.775	1001.19	5	RNS-SS-28-08	SL-8		717	81.1		22000	0.59	7.1	33	(0-6")	
441858.673	2472763.075	1000.64	5	RNS-SS-28-09	SL-9		283	7.6		19000	1.00	23.0	120	(0-6")	
442039.373	2472781.075	1001.05	5	RNS-SS-28-10	SL-10		1220	34.7		40000	0.57	2.5	9	(0-6")	
441941.373	2472911.775	1001.92	5	RNS-SS-28-11	SL-11		758	115		32000	0.50	6.9	28	(0-6")	
442170.073	2472754.075	999.59	5	RNS-SS-28-12	SL-12		206			76000	1.30	4.0	9	(0-6")	
442308.073	2473036.775	1001.09	5	RNS-SS-28-13	SL-13		1240	73		29000	0.09	4.9	19	(0-6")	
442374.773	2472756.075	1001.31	5	RNS-SS-28-14	SL-14		259			77000	2.30	7.5	45	(0-6")	
442492.773	2473005.775	1003.69	5	RNS-SS-28-15	SL-15		18.6			46000	2.90	35.0	155	(0-6")	
442350.773	2473170.475	999.69	5	RNS-SS-28-16	SL-16		381	9.9		31000	0.40	7.0	40	(0-6")	
442582.473	2472643.375	1013.34	5	RNS-SS-28-17	SL-17					50000	0.09	1.9	28	(0-6")	
442625.473	2472789.075	1002.56	5	RNS-SS-28-18	SL-18		803	34.2		25000	0.05	1.7	16	(0-6")	
442533.473	2473180.475	1000.70	5	RNS-SS-28-19	SL-19		1290	44.9		25000	0.60	3.0	15	(0-6")	
442724.173	2473106.475	1001.15	5	RNS-SS-28-20	SL-20		1120	46.6		29000	0.20	3.0	30	(0-6")	
441393.273	2472839.075	1000.92	5	RNS-SS-28-21	SL-5		271	23.1		66000	0.50	4.5	30	(0-6")	DUP SS-28-05
442374.773	2472756.075	1001.31	5	RNS-SS-28-22	SL-14		261	5.9		110000	1.50	5.5	20	(0-6")	DUP SS-28-14
469116.394	2446879.759	1196.90	2	RNS-SD-09-02		S-169	191			1400	115.00	255.0	405	(0-6")	
469268.271	2447274.973	1098.00	2	RNS-SD-09-03		S-171	1190			4500	64.00	218.0	322	(0-6")	

Notes:

- (1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.
- (2) "" Result of sample collected at Colonial Villa by OEPA in August 1991. If no value accompanies asterisk, result was considered either not detected or unusable.
- (3) Columns bearing headings D10, D30, and D60 um indicate particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively.
- (4) Validation qualifiers are not shown. See Figures 2,3, and 5 of Appendix N.

TABLE 6

Ruetgers-Neese Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon, & Grainsize Samples (1)

Northing	Easting	Elevation	Area	Sample Number	Sur. Num	Other Desig.	Mirex ug/kg	Photo M ug/kg	Kepona ug/kg	TOC mg/kg	D10 um	D30 um	D60 um	Sample Depth	QA/QC Sample
469457.853	2447800.432	1195.70	2	RNS-SD-09-04		S-179	179			1600	270.00	550.0	2950	(0-6")	DUP SD-09-04 MS/MSD
469457.853	2447800.432	1195.70	2	RNS-SD-09-05		S-179	71.3			1300	300.00	750.0	5000	(0-6")	
476711.410	2458969.415	1042.40	AR. 3	RNS-SD-15-02		S-438	11.9			1000	170.00	220.0	400	(0-6")	
476158.371	2459350.339	1038.20	AR. 3	RNS-SD-15-03		S-450	37.9	1		1500	60.00	180.0	280	(0-6")	
475744.813	2460207.155	1036.20	AR. 3	RNS-SD-15-04		S-471	20.5			1500	68.00	315.0	540	(0-6")	
475372.722	2460406.895	1035.10	AR. 3	RNS-SD-15-05		S-479	29.2			1600	95.00	270.0	405	(0-6")	
475218.172	2460744.027	1034.50	AR. 3	RNS-SD-15-06		S-484	24			13000	125.00	220.0	315	(0-6")	SD-28-02-116 FB MS/MSD DUP SD-28-04
442425.873	2473064.977	996.40	5	RNS-SD-28-02		S-681	138.5	1.6		9000	7.00	67.0	306	(0-6")	
441442.150	2473014.512	995.70	5	RNS-SD-28-03		S-688	223			40000	3.00	55.0	251	(0-6")	
441136.622	2472954.543	994.60	5	RNS-SD-28-04		S-689	28.6			19000	0.09	51.0	165	(0-6")	
441136.622	2472954.543	994.60	5	RNS-SD-28-05		S-689	32.2			13000	1.00	51.5	170	(0-6")	

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

(2) *** Result of sample collected at Colonial Villa by OEPA in August 1991. If no value accompanies asterisk, result was considered either not detected or unusable.

(3) Columns bearing headings D10, D30, and D60 um indicate particle sizes below which 10%, 30%, and 60% of soil by weight is composed, respectively.

(4) Validation qualifiers are not shown. See Figures 2,3, and 5 of Appendix N.

TABLE 6A
Parameter Values - Area 2, Alternate Area 3, and Area 5
MFLBC Phase II Sampling
Nease Site, Salem, Ohio

Area 2			Alternate Area 3			Area 5		
Sample Point	Percent Fine Fraction	TOC [mg-C/Kg-BulkSoil]	Sample Point	Percent Fine Fraction	TOC [mg-C/Kg-BulkSoil]	Sample Point	Percent Fine Fraction	TOC [mg-C/Kg-BulkSoil]
SS-09-01	58.7%	24,000	SS-15-01	87.7%	36,000	SS-28-01	13.1%	9,200
SS-09-31 (dup of 01)	NA	32,000	SS-15-02	88.0%	41,000	SS-28-02	89.5%	42,000
SS-09-02	77.6%	26,000	SS-15-16 (dup of 02)	NA	32,000	SS-28-03	45.1%	18,000
SS-09-03	67.8%	13,000	SS-15-03	76.1%	30,000	SS-28-04	45.0%	49,000
SS-09-04	48.3%	14,000	SS-15-04	71.3%	14,000	SS-28-05	82.8%	48,000
SS-09-05	77.5%	20,000	SS-15-05	84.4%	33,000	SS-28-21 (dup of 05)	NA	66,000
SS-09-06	42.8%	17,000	SS-15-06	81.9%	23,000	SS-28-06	90.3%	37,000
SS-09-07	48.2%	25,000	SS-15-07	70.1%	18,000	SS-28-07	40.7%	33,000
SS-09-08	43.2%	13,000	SS-15-08	77.7%	18,000	SS-28-08	76.9%	22,000
SS-09-09	57.2%	21,000	SS-15-09	75.1%	10,000	SS-28-09	48.0%	19,000
SS-09-10	59.4%	17,000	SS-15-10	75.8%	24,000	SS-28-10	91.6%	40,000
SS-09-11	42.1%	27,000	SS-15-11	88.0%	18,000	SS-28-11	84.8%	32,000
SS-09-12	72.3%	24,000	SS-15-12	83.8%	18,000	SS-28-12	91.5%	76,000
SS-09-13	73.0%	26,000	SS-15-17 (dup of 12)	NA	20,000	SS-28-13	88.2%	29,000
SS-09-14	61.6%	18,000	SS-15-13	85.8%	53,000	SS-28-14	70.9%	77,000
SS-09-15	62.1%	18,000	SS-15-14	85.5%	22,000	SS-28-22 (dup of 14)	NA	110,000
SS-09-21	51.8%	32,000	SS-15-15	74.2%	16,000	SS-28-15	37.6%	46,000
SS-09-22	41.5%	30,000	Averages	69.9%	24,375	SS-28-16	68.3%	31,000
SS-09-23	76.9%	51,000				SS-28-17	70.3%	50,000
SS-09-24	82.4%	30,000				SS-28-18	92.0%	25,000
SS-09-25	73.1%	28,000				SS-28-19	93.9%	25,000
SS-09-26	58.1%	20,000				SS-28-20	82.6%	29,000
SS-09-27	54.4%	20,000				Averages	63.8%	41,509
SS-09-28	55.0%	24,000						
SS-09-29	63.9%	26,000						
SS-09-30	58.1%	24,000						
Averages	58.0%	23,846						

Note:

Fine Fraction = Weight Fraction of bulk-soil passing 63um sieve

TOC = Total Organic Carbon content

For TOC, if primary and field duplicate sample were collected at given location, higher of two results was selected to represent location. Fine Fractions for duplicates were unavailable for comparison.

NA-Not Available

TABLE 7

Ruefegers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon & Grainsize Samples - Location Descriptions (1)

Northing	Easting	Elevation	Area	Sample Number	Other Desig	Sample Depth	Sampling Location Description
468879.44	2446636.259	1103.11	2	RNS-SS-09-01		(0-6")	Moist, brown silt loam, heavy grass cover
488976.563	2447090.267	1102.79	2	RNS-SS-09-02		(0-6")	Moist, brown silt loam, trace oxidation, mottles - light vegetation
469125.436	2446642.301	1101.8	2	RNS-SS-09-03		(0-6")	Moist, red-brown silt/sand loam, light root zone, grass cover, standing water evidence
469228.998	2446685.305	1101.26	2	RNS-SS-09-04		(0-6")	Same as above - brush and tree saplings nearby
469335.432	2446662.343	1101.87	2	RNS-SS-09-05		(0-6")	Black muck soil and red-brown clay in standing water, cattails
469336.993	2446686.346	1101.35	2	RNS-SS-09-06		(0-6")	Very moist-wet clayey sand, adjacent to standing water, cattails, grasses, abundant trees
469377.555	2447194.35	1100.66	2	RNS-SS-09-07		(0-6")	Very moist red-brown silty, fine sandy clay, heavy grass cover, light root zone, trees
469386.877	2447580.357	1099.44	2	RNS-SS-09-08		(0-6")	Wet brown silty sand with black clay at creek edge (emergent) no vegetation
469685.112	2447316.395	1111.65	2	RNS-SS-09-09		(0-6")	Moist brown silty clay with abundant root hairs in drainage ditch, some gravel, grass vegetation
469544.673	2447601.399	1099.76	2	RNS-SS-09-10		(0-6")	Moist red-brown silt loam, heavy grass cover, heavy root zone, scattered brush
469024.217	2446874.804	1101.7	2	RNS-SS-09-11	CV-1	(0-6")	Moist brown sandy loam with gravel, heavy mowed grass cover
469236.322	2447398.319	1099.16	2	RNS-SS-09-12	CV-11	(0-6")	Moist brown silt clay loam, heavy mowed grass cover
469241.107	2447470.445	1100.05	2	RNS-SS-09-13	CV-13	(0-6")	Moist brown clay loam, heavy mowed grass cover
469264.572	2447386.316	1098.9	2	RNS-SS-09-14	CV-10	(0-6")	Moist brown silt loam, heavy mowed grass cover, located on side of small swale
469280.009	2447449.07	1099.59	2	RNS-SS-09-15	CV-12	(0-6")	Moist brown silt loam, heavy mowed grass cover
469024.217	2446874.804	1101.7	2	RNS-SS-09-16	CV-1	(6-12")	Moist brown sandy loam with gravel, below RNS-SS-09-11
469236.322	2447398.319	1099.16	2	RNS-SS-09-17	CV-11	(6-12")	Moist brown silt loam, below RNS-SS-09-12
469241.107	2447470.445	1100.05	2	RNS-SS-09-18	CV-13	(6-12")	Moist brown clay loam with red mottles, below RNS-SS-09-13
469264.572	2447386.316	1098.9	2	RNS-SS-09-19	CV-10	(6-12")	Moist brown silt loam, below RNS-SS-09-14
469280.009	2447449.07	1099.59	2	RNS-SS-09-20	CV-12	(6-12")	Moist brown silt loam, below RNS-SS-09-15
468846.691	2446918.817	1104.89	2	RNS-SS-09-21	CV-3	(0-6")	Moist dark brown silty sandy clay, trace cobbles, roots, part of mowed area near pool

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

TABLE 7

Rutgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 18, 1993

Mirex/Photomirex/Kepona, Total Organic Carbon & Grainsize Samples - Location Descriptions (1)

Northing	Easting	Elevation	Area	Sample Number	Other Desig	Sample Depth	Sampling Location Description
468981.996	2446885.018	1102.43	2	RNS-SS-09-22	CV-2	(0-6")	Moist brown sandy loam, trace gravel, heavy grass in mowed area
468897.401	2447182.891	1102.37	2	RNS-SS-09-23	CV-8	(0-6")	Wet brown clay loam, wet area surrounded by cattails
469044.439	2447122.031	1101.67	2	RNS-SS-09-24	CV-5	(0-6")	Moist red-brown clay loam, heavy mowed grass cover
469106.498	2447098.025	1100.5	2	RNS-SS-09-25	CV-4	(0-6")	Moist brown clay loam, heavy mowed grass cover
469148.022	2447250.173	1101.52	2	RNS-SS-09-26	CV-8	(0-6")	Moist brown silt loam with some gravel, heavy mowed grass cover
469196.27	2447230.483	1101.15	2	RNS-SS-09-27	CV-7	(0-6")	Moist red-brown silt loam with gravel, heavy mowed grass cover
469041.815	2447294.29	1106.06	2	RNS-SS-09-28	CV-9	(0-6")	Moist brown clay loam with abundant root hairs above flat of overbank, heavy mowed grass cover
469264.572	2447592.584	1102.5	2	RNS-SS-09-29	CV-15	(0-6")	Moist sandy loam and gravel in heavy mowed grass cover
469331.569	2447555.626	1100.7	2	RNS-SS-09-30	CV-14	(0-6")	Moist brown sandy clay loam, heavy mowed grass cover
468879.44	2446836.259	1103.11	2	RNS-SS-09-31		(0-6")	Moist brown silt loam, heavy grass cover
475433.616	2459610.772	1042.48	AR.3	RNS-SS-15-01		(0-6")	Moist brown silt loam in fallow soybean field with sparse weed growth
475180.616	2460002.772	1042.49	AR.3	RNS-SS-15-02		(0-6")	Moist brown silt loam in heavily wooded area beneath tree, near very old abandoned channel
475144.616	2460382.722	1038.17	AR.3	RNS-SS-15-03		(0-6")	Moist brown silt clay loam, located in heavily wooded area adjacent to small feeder creek
475744.616	2459486.772	1044.24	AR.3	RNS-SS-15-04		(0-6")	Moist brown silt loam in fallow soybean field with sparse weed growth
475450.616	2459583.772	1042.7	AR.3	RNS-SS-15-05		(0-6")	Moist brown silt loam in fallow soybean field with sparse weed growth
475694.616	2460252.772	1043.57	AR.3	RNS-SS-15-06		(0-6")	Moist brown silt loam at edge of cut bank approximately 8 feet above creek, heavy trees and brush
476205.616	2459338.772	1044.21	AR.3	RNS-SS-15-07		(0-6")	Moist red-brown sand loam located near fence row in wooded and brushy area
476124.616	2459597.772	1043.61	AR.3	RNS-SS-15-08		(0-6")	Moist brown silt loam in plowed corn field
476060.616	2459952.772	1042.73	AR.3	RNS-SS-15-09		(0-6")	Moist brown clay loam in plowed corn field
476829.616	2459348.772	1043.93	AR.3	RNS-SS-15-10		(0-6")	Significantly moist red-brown silt loam at fence row within heavily wooded area
476451.616	2459940.772	1043.72	AR.3	RNS-SS-15-11		(0-6")	Moist brown clay loam in plowed corn field

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

TABLE 7

Rutgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 18, 1993

Mirex/Photomirex/Kepone, Total Organic Carbon & Grainsize Samples - Location Descriptions (1)

Northing	Easting	Elevation	Area	Sample Number	Other Desig	Sample Depth	Sampling Location Description
476346.616	2459965.772	1043.15	A11.3	RNS-SS-15-12		(0-6")	Moist brown clay loam in plowed cornfield
476783.616	2459349.772	1045.72	A11.3	RNS-SS-15-13		(0-6")	Slightly moist red-brown silt loam on fence row within heavily wooded area
476738.616	2459944.772	1043.26	A11.3	RNS-SS-15-14		(0-6")	Moist red-brown clay loam in plowed cornfield
476921.616	2460035.772	1046.14	A11.3	RNS-SS-15-15		(0-6")	Moist red-brown clay loam in plowed cornfield
475180.616	2460002.772	1042.49	A11.3	RNS-SS-15-16		(0-6")	Moist brown silt loam in heavily wooded area beneath tree, near very old abandoned channel
476346.616	2459965.772	1043.15	A11.3	RNS-SS-15-17		(0-6")	Moist brown clay loam in plowed cornfield
440783.173	2472722.075	1007.23	5	RNS-SS-28-01		(0-6")	Moist fine sand, trace pebbles, heavy grass and trees, adjacent to high cut bank
441013.873	2472679.075	999.48	5	RNS-SS-28-02		(0-6")	Moist brown silty clay in heavy weeds and brush, adjacent to high cut bank
441044.873	2472864.775	999.42	5	RNS-SS-28-03		(0-6")	Moist brown fine sand and silt adjacent to high cut bank, heavy weeds
441480.273	2472583.375	1010.44	5	RNS-SS-28-04		(0-6")	Moist red-brown sandy loam with pebbles, on edge on old road grade
441393.273	2472839.075	1000.92	5	RNS-SS-28-05		(0-6")	Moist red-brown silty clay loam located in brushy area near very old log jam
441424.273	2472925.775	1000.3	5	RNS-SS-28-06		(0-6")	Moist red-brown silty clay loam, oxidized mottles, heavy grass cover with nearby brush
441678.973	2472682.075	1007.37	5	RNS-SS-28-07		(0-6")	Moist red-brown silt loam with gravel, located above break in flat area
441575.873	2472925.775	1001.19	6	RNS-SS-28-08		(0-6")	Moist red-brown silty clay loam in heavy grass cover
441858.673	2472763.075	1000.64	5	RNS-SS-28-09		(0-6")	Moist fine sand with silt and some clay on side of cut bank approximately 1.5 feet below top
442039.373	2472781.075	1001.05	5	RNS-SS-28-10		(0-6")	Very moist brown silty clay, swampy area nearby, heavy brush
441941.373	2472911.775	1001.92	5	RNS-SS-28-11		(0-6")	Moist brown silt loam, adjacent to tree in wooded area with heavy weeds
442170.073	2472754.075	999.58	5	RNS-SS-28-12		(0-6")	Saturated black muck soil in thick brushy swamp
442308.073	2473036.775	1001.09	5	RNS-SS-28-13		(0-6")	Moist red-brown silty clay loam in heavy grass adjacent to wooded area
442374.773	2472758.075	1001.31	5	RNS-SS-28-14		(0-6")	Wet, brown muck & silty clay, grass covered near swamp
442492.773	2473005.775	1003.69	5	RNS-SS-28-15		(0-6")	Moist red-brown sandy loam adjacent to a suspect levee deposit

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

TABLE 7

Rutgers-Nease Corporation

MFLBC Overbank Deposit and Sediment Sampling, Phase II

Sampling Dates: May 10 thru May 15, 1993

Mirex/Polomirex/Kepone, Total Organic Carbon & Grainsize Samples - Location Descriptions (1)

Northing	Easting	Elevation	Area	Sample Number	Other Desig	Sample Depth	Sampling Location Description
442350.773	2473170.475	999.69	5	RNS-SS-28-16		(0-6")	Moist red-brown silty clay loam, heavy grass and weeds, adjacent to ox bow
442582.473	2472843.375	1013.34	5	RNS-SS-28-17		(0-6")	Dark gray silty clay on side of coal spoil pile, heavily wooded
442625.473	2472789.075	1002.56	5	RNS-SS-28-18		(0-6")	Moist brown silty clay, bare ground surrounded by heavy brush
442533.473	2473180.475	1000.7	5	RNS-SS-28-19		(0-6")	Red-brown silty clay loam, light grass, wooded, adjacent to oxbow
442724.173	2473106.475	1001.15	5	RNS-SS-28-20		(0-6")	Moist brown, soft, silty clay, in area of dead grass (from previous standing water) and brush
441393.273	2472839.075	1000.92	5	RNS-SS-28-21		(0-6")	Moist red-brown silty clay loam located in brushy area near very old log jam
442374.773	2472756.075	1001.31	5	RNS-SS-28-22		(0-6")	Wet, brown muck & silty clay, grass covered near swamp
469116.3936	2448879.7586	1196.9	2	RNS-SD-09-02	S-189	(0-6")	Submergent in relatively calm straight section
469268.2712	2447274.9732	1098	2	RNS-SD-09-03	S-171	(0-6")	Emergent heavily grassed in calm straight section
469457.8528	2447800.4316	1195.7	2	RNS-SD-09-04	S-179	(0-6")	Submergent in deep pool on calm bend
469457.8528	2447800.4316	1195.7	2	RNS-SD-09-05	S-179	(0-6")	Submergent in deep pool on calm bend
476711.4095	2458999.4148	1042.4	Alt. 3	RNS-SD-15-02	S-438	(0-6")	Submergent in shallow very long straight section
476158.3714	2459350.3392	1038.2	Alt. 3	RNS-SD-15-03	S-450	(0-6")	Submergent in relatively deep pool on bend
476744.8127	2460207.1548	1036.2	Alt. 3	RNS-SD-15-04	S-471	(0-6")	Submergent adjacent to tributary, calm
475372.7219	2460406.8949	1035.1	Alt. 3	RNS-SD-15-05	S-479	(0-6")	Emergent in calm narrow straight section
475218.1724	2460744.0265	1034.5	Alt. 3	RNS-SD-15-06	S-484	(0-6")	Submergent in calm pool under bridge
442425.8731	2473064.9773	996.4	5	RNS-SD-28-02	S-681	(0-6")	Submergent in calm long gentle bend
441442.1495	2473014.5116	995.7	5	RNS-SD-28-03	S-688	(0-6")	Submergent in relatively deep calm pool
441136.6223	2472954.5426	994.6	5	RNS-SD-28-04	S-689	(0-6")	Submergent in relatively deep calm pool
441136.6223	2472954.5426	994.6	5	RNS-SD-28-05	S-689	(0-6")	Submergent in relatively deep calm pool

Notes:

(1) Table provided by MFLBC Statistical Analysis Report, ERM-Midwest, March 1994.

TABLE 8
Preferred Habitats for Indicator Species
Nease Site, Salem, Ohio

Indicator Species	Preferred Habitats	Reference
Great blue heron	Shallow shores of ponds, lakes, streams, and rivers; wooded swamps; freshwater bogs and marshes. Nests in tall trees near water or wetlands. (PFO, PSS, PEM, OW)	Short and Cooper 1985; DeGraaf and Rudis 1987
Belted kingfisher	Pond, lake, river, and stream edges with abundant fish, clear water, and available perch sites. Nests in upland banks near water. (OW)	Prose 1985; DeGraaf and Rudis 1987
Sora	Shallow freshwater marshes with high interspersions of open water and dense emergent vegetation. (PEM, OW)	Melvin and Gibbs 1994; DeGraaf and Rudis 1987
Virginia rail	Shallow freshwater marshes with dense emergent vegetation interspersed with open water or mud flats. (PEM, OW)	Conway and Eddleman 1994; DeGraaf and Rudis 1987
Northern harrier	Open country (fields or agricultural areas); freshwater marshes; wet meadows. (PEM, ESF, MSF, P, AG)	DeGraaf and Rudis 1987
American robin	Open woodlands and woodland edges, fields, orchards, and residential areas. (PFO, PSS, MSF, UF, AG)	DeGraaf and Rudis 1987
Red fox	Intermixed croplands, fields, shrubby areas, and wooded habitats. Use habitat edges heavily. (ESF, MSF, P, UF, AG)	Samuel and Nelson 1982; DeGraaf and Rudis 1987
Mink	Utilizes stream and river banks, lake shores, and freshwater marshes. Favors forested wetlands adjacent to stream channels (riparian areas) containing abundant cover. (PFO, PSS, PEM)	Allen 1986; DeGraaf and Rudis 1987

Habitat types:

AG	Agricultural	P	Pasture	UF	Upland Forest
ESF	Early Successional Field	PEM	Palustrine Emergent		
MSF	Mid Successional Field	PFO	Palustrine Forested		
OW	Open Water	PSS	Palustrine Scrub/Shrub		

great egret
common pintail
white-throated sparrow
yellow-rumped warbler
river otter

TABLE 9
MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 1 of 6

Transect	Sample	Wetland Habitat Types ^a	Indicator Species ^c	Upland Habitat Types ^b	Indicator Species ^c
Phase III Transects					
08A	95-08A-01	PFO	GBHE; AMRO; MINK	---	NOHA; REFO
	95-08A-02	PFO		---	
	95-08A-03	---		ESF	
08B	95-08B-01	PFO	GBHE; AMRO; MINK	---	AMRO
	95-08B-02	PFO		---	
	95-08B-03	---		UF	
10	95-10-01	PFO	GBHE; AMRO; MINK	---	Not applicable
	95-10-02	PSS		---	
	95-10-03	PSS		---	
11	95-11-01	---	GBHE; AMRO; MINK	UF	AMRO
	95-11-02	---		UF	
	95-11-03	PFO		---	
12	95-12-01	No bordering wetlands	GBHE; BEKI	P	NOHA; REFO
	95-12-02	No bordering wetlands		P	
	95-12-03	No bordering wetlands		P	
	95-12-04	No bordering wetlands		P	

TABLE 9
MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 2 of 6

Transect	Sample	Wetland Habitat Types^a	Indicator Species^c	Upland Habitat Types^b	Indicator Species^c
14	95-14-01	PFO	GBHE; AMRO; MINK	---	Not applicable
	95-14-02	PSS		---	
	95-14-03	PSS		---	
23	95-23-01	PEM	GBHE; SORA; VIRA; NOHA; AMRO; MINK	---	Not applicable
	95-23-02	PEM		---	
	95-23-03	PSS		---	
	95-23-04	PSS		---	
24	95-24-01	---	GBHE; SORA; VIRA; NOHA; MINK	ESF	NOHA; REFO
	95-24-02	PEM		---	
	95-24-03	PEM		---	
26A	95-26A-01	---	GBHE; AMRO; MINK	ESF; MSF	NOHA; REFO
	95-26A-02	PSS		---	
	95-26A-03	PSS		---	
26B	95-26B-01	PSS	GBHE; AMRO; MINK	---	NOHA; REFO
	95-26B-02	PSS		---	
	95-26B-03	---		AG	

TABLE 9

MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 3 of 6

Transect	Sample	Wetland Habitat Types ^a	Indicator Species ^c	Upland Habitat Types ^b	Indicator Species ^c
Existing Transects					
09	93-09-01	PSS	GBHE; AMRO; MINK	---	NOHA; AMRO; REFO
	93-09-02	---		UF	
	93-09-03	---		AG	
	93-09-04	PSS		---	
	93-09-05	---		AG	
	93-09-06	PSS		---	
	93-09-07	PSS		---	
	93-09-08	PSS		---	
	93-09-09	---		AG	
	93-09-10	PSS		---	
12	91-12-01	---	GBHE; AMRO; MINK	P	NOHA; REFO
	91-12-02	PFO		---	
	91-12-03	---		AG	
	91-12-04	---		AG	

TABLE 9
MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 4 of 6

Transect	Sample	Wetland Habitat Types^a	Indicator Species^c	Upland Habitat Types^b	Indicator Species^c
15	93-15-01	---	GBHE; AMRO; SORA; VIRA; NOHA; MINK	AG	NOHA; AMRO; REFO
	93-15-02	---		AG	
	93-15-03	PFO		---	
	93-15-04	---		AG	
	93-15-05	---		AG	
	93-15-06	---		UF	
	93-15-07	PEM		---	
	93-15-08	---		MSF	
	93-15-09	---		MSF	
	93-15-10	---		MSF	
	93-15-11	---		MSF	
	93-15-12	---		MSF	
	93-15-13	---		MSF	
	93-15-14	---		MSF	
	93-15-15	---		MSF	

TABLE 9
MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 5 of 6

Transect	Sample	Wetland Habitat Types^a	Indicator Species^c	Upland Habitat Types^b	Indicator Species^c
17	91-17-01	No bordering wetlands	GBHE; BEKI	AG	NOHA; REFO
	91-17-02	No bordering wetlands		AG	
	91-17-03	No bordering wetlands		AG	
	91-17-04	No bordering wetlands		AG	
Egypt Swamp	Multiple	PEM; PFO; PSS	GBHE; SORA; VIRA; NOHA; AMRO; MINK	AG; UF	NOHA; AMRO; REFO
27	91-27-01	---	GBHE; AMRO; MINK	AG	NOHA; REFO
	91-27-02	---		AG	
	91-27-03	PSS		---	
	91-27-04	PSS		---	
28	91-28-01	PSS	GBHE; SORA; VIRA; NOHA; AMRO; MINK	---	AMRO
	91-28-02	PSS		---	
	91-28-03	PSS		---	
	91-28-04	---		UF	
	91-28-05	PSS		---	
	91-28-06	PSS		---	
	91-28-07	PFO		---	
	91-28-08	PSS		---	

TABLE 9
MFLBC Floodplain Samples, Associated Habitats and Indicator Species

Sheet 6 of 6

Transect	Sample	Wetland Habitat Types ^a	Indicator Species ^c	Upland Habitat Types ^b	Indicator Species ^c
	91-28-09	---		UF	
	91-28-10	PFO		---	
	91-28-11	---		UF	
	91-28-12	PFO		---	
	91-28-13	PSS		---	
	91-28-14	---		UF	
	91-28-15	PSS		---	
	91-28-16	PEM		---	
	91-28-17	---		UF	
	91-28-18	PFO		---	
	91-28-19	PEM		---	
	91-28-20	PSS		---	

^a PFO - Palustrine Forested; PSS - Palustrine Scrub-shrub; PEM - Palustrine Emergent.

^b ESF - Early Successional Field; MSF - Mid Successional Field; AG - Agricultural; P - Pasture; UF - Upland Forest.

^c GBHE - Great blue heron; BEKI - Belted kingfisher; VIRA - Virginia rail; SORA - Sora; AMRO - American robin; NOHA - Northern Harrier; REFO - Red fox; MINK - Mink.

TABLE 10

**Sampling Locations Across Indicator Species Habitats
Summary of Phase III and Existing MFLBC Floodplain Soil and Sediment Transects
Stations 1 through 31**

Indicator Species	MFLBC Habitat Type	Transect Samples in Appropriate Floodplain Habitat			Samples in Open Water Habitat	
		Phase III	Existing	Total	Phase III	Existing
Great blue heron	PFO, PSS, PEM, OW	25	48	73	4	39
Belted kingfisher	OW	NA	NA	NA	4	39
Sora	PEM, OW	8	12	20	4	39
Virginia rail	PEM, OW	8	12	20	4	39
Northern harrier	PEM, ESF, MSF, P, AG	13	37	50	NA	NA
American robin	PFO, PSS, MSF, UF, AG	22	66	88	NA	NA
Red fox	ESF, MSF, P, UF, AG	12	32	44	NA	NA
Mink	PFO, PSS, PEM	21	48	69	NA	NA

NOTES:

NA - Not Applicable. Species does not forage extensively in the habitat concerned.

Habitat Types:

AG Agricultural
ESF Early Successional Field
MSF Mid Successional Field
OW Open Water
P Pasture
PEM Palustrine Emergent
PFO Palustrine Forested
PSS Palustrine Scrub/Shrub
UF Upland Forest

Table 11
Sampling Parameters For Floodplain Transect Stations and Metals Sampling Stations
MFLBC Phase III
Nease Site, Salem, Ohio

Sample Station	Sampling Date	Sample Location RNC ID/Laboratory ID	Parameters Analyzed	QA/QC Samples	Shipping Date
SD95-M-1	9/6/95	SD95-M-1	TAL Metals		9/7/95
SD95-M-2	9/6/95	SD95-M-2	TAL Metals	SD95-M-5FD: field duplicate (sed)	9/7/95
SD95-M-3	9/6/95	SD95-M-3	TAL Metals		9/7/95
SD95-M-4	9/6/95	SD95-M-4	TAL Metals		9/7/95
SD95-M-5	9/6/95	SD95-M-5	TAL Metals	RB95-M-5: rinsate blank (sed)	9/7/95
SD95-M-6	9/5/95	SD95-M-6	TAL Metals		9/7/95
SD95-M-7	9/5/95	SD95-M-7	TAL Metals		9/7/95
SD95-M-8	9/5/95	SD95-M-8	TAL Metals	SD95-M-8: MS/MSD (sed)	9/7/95
SD95-M-9	9/13/95	SD95-M-9	TAL Metals		9/14/95
SS/SD95-08A SD95-M-10	9/13/95	SD95-08A-01 SS95-08A-01 SS95-08A-02 SS95-08A-03 SD95-M-10	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS TAL Metals	RB95-08A-01: MPK - rinsate blank (sed)	9/14/95
SS/SD95-08B	9/13/95	SD95-08B-01 SS95-08B-01 SS95-08B-02 SS95-08B-03	MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC	SD95-08B-01FD: SVOC,MPK-field duplicate (sed) SS95-08B-02: SVOC - MS/MSD (soil)	9/14/95
SS/SD95-10 SD95-M-11	9/12/95	SD95-10-01 SS95-10-01 SS95-10-02 SS95-10-03 SD95-M-11	MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC TAL Metals	RB95-10-01: SVOC-rinsate blank (sed) SS95-10-02FD: SVOC-field duplicate (soil)	9/12/95

Table 11
Sampling Parameters For Floodplain Transect Stations and Metals Sampling Stations
MFLBC Phase III
Nease Site, Salem, Ohio

Sample Station	Sampling Date	Sample Location RNC ID/Laboratory ID	Parameters	QA/QC Samples	Shipping Date
SS95-11	9/12/95	SS95-11-01 SS95-11-02 SS95-11-03	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	SS95-11-01: MPK-MS/MSD (soil)	9/12/95
SS/SD95-12	9/11/95	SD95-12-01 SS95-12-01 SS95-12-02 SS95-12-03 SS95-12-04	MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC MPK, TOC, GS, SVOC	SD95-12-01FD: SVOC, MPK-field duplicate (sed) RB95-12-03: SVOC-rinsate blank (soil)	9/12/95
SS95-14	9/7/95	SS95-14-01 SS95-14-02 SS95-14-03	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	SS95-14-01: MPK-field duplicate (soil)	9/7/95
SS95-23	9/8/95	SS95-23-01 SS95-23-02 SS95-23-03 SS95-23-04	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	RB95-23-02: MPK-rinsate blank (soil)	9/12/95
SS95-24	9/7/95	SS95-24-01 SS95-24-02 SS95-24-03	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	SS95-24-01: MPK-MS/MSD (soil)	9/7/95
SS95-26A	9/11/95	SS95-26A-01 SS95-26A-02 SS95-26A-03	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	SS95-26A-02FD: MPK-field duplicate (soil)	9/12/95
SS95-26B	9/10/95	SS95-26B-01 SS95-26B-02 SS95-26B-03	MPK, TOC, GS MPK, TOC, GS MPK, TOC, GS	RB95-26B03: MPK-rinsate blank (soil)	9/12/95

TABLE 11A
USEPA SPLIT SAMPLES
MFLBC - Phase III
Nease Site, Salem, Ohio

Oversight Sample ID	RNC Sample ID	Date Sampled	Analyses
RNC-ST2-001	SD95-M-2	9/6/95	TAL Metals
RNC-ST4-001	SD95-M-4	9/6/95	TAL Metals
RNC-ST5-001	SD95-M-5	9/6/95	TAL Metals
RNC-ST5-101 (oversight field duplicate)	SD95-M-5	9/6/95	TAL Metals
RNC-ST10-001	SD95-10-01		
RNC-ST10-101	SD95-10-01	9/12/95	MPK and SVOC
RNC-ST12-001	SD95-12-01	9/11/95	MPK and SVOC
RNC-ST12-101 (oversight field duplicate)	SD95-12-01	9/11/95	MPK and SVOC
RNC-SS12-001	SS95-12-02	9/11/95	MPK and SVOC
RNC-SS12-002	SS95-12-04	9/11/95	MPK and SVOC
RNC-SS12-102 (oversight field duplicate)	SS95-12-04FD (RNC field duplicate)	9/11/95	MPK and SVOC
RNC-SS14-001	SS95-14-02	9/7/95	MPK only
RNC-SS14-101 (oversight field duplicate)	SS95-14-02	9/7/95	MPK only
RNC-SS14-002	SS95-14-03	9/7/95	MPK only
RNC-SS24-001	SS95-24-02	9/7/95	MPK only
RNC-SS24-002	SS95-24-03	9/7/95	MPK only
RNC-SS26-001	SD95-26B-01	9/10/95	MPK only

Split samples collected by Black and Veatch.

Analyses performed by Skinner and Sherman Analytical Laboratory.

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
TCL Semivolatile Organics
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-10-01		Sample Point SS95-10-02		Sample Point SS95-10-02FD		Sample Point SS95-10-03		Sample Point SS95-12-01	
	Lab ID: L9165-6		Lab ID: L9165-7		Lab ID: L9165-23		Lab ID: L9165-8		Lab ID: L9165-11	
	Date Sampled: 9/12/95		Date Sampled: 9/12/95		Date Sampled: 9/12/95		Date Sampled: 9/12/95		Date Sampled: 9/11/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Benzoic acid	---	---	---	---	---	---	290	J	---	---
Phenanthrene	210	J	290	J	330	J	---	---	---	---
Fluoranthene	410		420		470		---	---	240	J
Pyrene	350	J	340	J	370		---	---	190	J
Benzo(a)Anthracene	210	J	190	J	200	J	---	---	---	---
Chrysene	250	J	220	J	220	J	---	---	---	---
Benzo(b)Fluoranthene	360	J	210	J	240	J	---	---	---	---
Benzo(a)Pyrene	240	J	---	---	---	---	---	---	---	---

Notes:

All units are µg/Kg.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics

--- indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
TCL Semivolatile Organics
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix Floodplain Soil

Parameter	Sample Point SS95-12-02		Sample Point		Sample Point		Sample Point		Sample Point	
	Lab ID: L9165-12		Lab ID:		Lab ID:		Lab ID:		Lab ID:	
	Date Sampled: 9/11/95		Date Sampled:		Date Sampled:		Date Sampled:		Date Sampled:	
	Result	Qual	Result		Result		Result		Result	
Benzoic acid	---	---								
Phenanthrene	---	---								
Fluoranthene	220	J								
Pyrene	---	---								
Benzo(a)Anthracene	---	---								
Chrysene	---	---								
Benzo(b)Fluoranthene	---	---								
Benzo(a)Pyrene	---	---								

Notes:

All units are µg/Kg.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
Mirex, Photomirex, Kepone
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-08A-01		Sample Point SS95-08B-03		Sample Point SS95-10-01		Sample Point SS95-10-02		Sample Point SS95-10-02FD	
	Lab ID: L9189-5		Lab ID: L9189-4		Lab ID: L9165-6		Lab ID: L9165-7		Lab ID: L9165-23	
	Date Sampled 9/13/95		Date Sampled 9/13/95		Date Sampled 9/12/95		Date Sampled 9/12/95		Date Sampled 9/12/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Mirex	177		34.0		294		174		94.7	
Photomirex	---	---	---	---	95.6		66.1		43.5	
Kepone	---	---	---	---	135		70.4		51.3	

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

SUMMARY OF DETECTED CONCENTRATIONS

Mirex, Photomirex, Kepone

MFLBC Phase III

Nease Site, Salem, Ohio

Matrix Floodplain Soil

Parameter	Sample Point SS95-10-03		Sample Point SS95-11-01		Sample Point SS95-11-02		Sample Point SS95-12-01		Sample Point SS95-12-02	
	Lab ID: L9165-8		Lab ID: L9165-1		Lab ID: L9165-2		Lab ID: L9165-11		Lab ID: L9165-12	
	Date Sampled: 9/12/95		Date Sampled: 9/12/95		Date Sampled: 9/12/95		Date Sampled: 9/11/95		Date Sampled: 9/11/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Mirex	31.1		20.3		100		148		111	
Photomirex	---	---	---	---	4.4		212		108	
Kepone	---	---	---	---	5.0	J	169		193	

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
Mirex, Photomirex, Kepone
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-12-03		Sample Point SS95-12-04		Sample Point SS95-14-01		Sample Point SS95-14-01FD		Sample Point SS95-14-02	
	Lab ID: L9165-14		Lab ID: L9165-15		Lab ID: L9121-13		Lab ID: L9121-14		Lab ID: L9121-12	
	Date Sampled: 9/11/95		Date Sampled: 9/11/95		Date Sampled: 9/7/95		Date Sampled: 9/7/95		Date Sampled: 9/7/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Mirex	198		130		156		186		350	
Photomirex	5.5		112		10.5		10.8		58.0	
Kepone	---	---	118		12.8		16.0		179	

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
Mirex, Photomirex, Kepone
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-14-03		Sample Point SS95-23-01		Sample Point SS95-23-02		Sample Point SS95-24-01		Sample Point SS95-24-02	
	Lab ID: L9121-11		Lab ID: L9124-6		Lab ID: L9124-7		Lab ID: L9124-1		Lab ID: L9124-2	
	Date Sampled: 9/7/95		Date Sampled: 9/8/95		Date Sampled: 9/8/95		Date Sampled: 9/7/95		Date Sampled: 9/7/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Mirex	25.7		44.4		346		---	---	39.9	
Photomirex	---	---	3.5		3.6		55.8		---	---
Kepone	---	---	---	---	---	---	81.6		---	---

Notes:

All units are µg/Kg (dry weight)

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. [blank space] - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12a
SUMMARY OF DETECTED CONCENTRATIONS
Mirex, Photomirex, Kepone
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-24-03		Sample Point SS95-26A-01		Sample Point SS95-26A-02		Sample Point SS95-26A-02FD		Sample Point SS95-26B-01	
	Lab ID: L9124-3		Lab ID: L9165-9		Lab ID: L9165-10		Lab ID: L9165-19		Lab ID: L9165-20	
	Date Sampled: 9/7/95		Date Sampled: 9/11/95		Date Sampled: 9/11/95		Date Sampled: 9/11/95		Date Sampled: 9/10/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Mirex	75 2		54.8		247		243		334	
Photomirex	---	---	---	---	30 2		29 1		8 0	
Kepone	---	---	---	---	42 2		48 0		4 8	

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics.

--- indicates not detected

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. (blank space) - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

SUMMARY OF DETECTED CONCENTRATIONS

Mirex, Photomirex, Kepone

MFLBC Phase III

Nease Site, Salem, Ohio

Matrix: Floodplain Soil

Parameter	Sample Point SS95-26B-02		Sample Point SS95-26B-03		Sample Point		Sample Point		Sample Point	
	Lab ID: L9165-21		Lab ID: L9165-22		Lab ID:		Lab ID:		Lab ID:	
	Date Sampled: 9/10/95		Date Sampled: 9/10/95		Date Sampled:		Date Sampled		Date Sampled:	
	Result	Qual	Result	Qual	Result		Result		Result	
Mirex	157		118							
Photomirex	39.1		26.4							
Kepone	68.0		57.9							

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

Floodplain soil samples collected during MFLBC Phase III were not analyzed for TAL Inorganics

--- indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown. [blank space] - Acceptable (Quantitative) Data J - Estimated (Subquantitative) Data

TABLE 12b
SUMMARY OF DETECTED CONCENTRATIONS
Mirex, Photomirex, Kepone
MFLBC Phase III
Nease Site, Salem, Ohio

Matrix: Sediment

Parameter	Sample Point SD95-10-01		Sample Point SD95-12-01		Sample Point SD95-12-01FD		Sample Point		Sample Point	
	Lab ID: L9165-4		Lab ID: L9165-13		Lab ID: L9165-17		Lab ID:		Lab ID:	
	Date Sampled: 9/12/95		Date Sampled: 9/11/95		Date Sampled: 9/11/95		Date Sampled:		Date Sampled:	
	Result	Qual	Result	Qual	Result	Qual	Result		Result	
Mirex	344		178		277					

Notes:

All units are µg/Kg (dry weight).

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

--- indicates not detected.

TCL Semivolatiles were not detected in sediment samples collected during MFLBC Phase III.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], or J - qualified results) are shown.

{blank space} - Acceptable (Quantitative) Data

J - Estimated (Subquantitative) Data

TABLE 12b
SUMMARY OF DETECTED CONCENTRATIONS

Matrix: Sediment

TAL Inorganics
MFLBC Phase III
Nease Site, Salem, Ohio

Parameter	Sample Point SD95-M-1		Sample Point SD95-M-2		Sample Point SD95-M-2FD		Sample Point SD95-M-3		Sample Point SD95-M-4	
	Lab ID: L9121-9		Lab ID: L9121-7		Lab ID: L9121-8		Lab ID: L9121-6		Lab ID: L9121-5	
	Date Sampled: 9/6/95		Date Sampled: 9/6/95		Date Sampled: 9/6/95		Date Sampled: 9/6/95		Date Sampled: 9/6/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Aluminum	8744		9177		17660		22009		4762	
Antimony	0.28	J	1.1	J	1.8	J	2.1	J	—	—
Arsenic	8.3		12.5		19.4		28.0		15.9	
Barium	73.4	J	93.6	J	137	J	114	J	38.9	J
Beryllium	0.72	J	0.81	J	1.8	J	2.5	J	0.43	J
Cadmium	—	—	3.4	J	5.0	J	6.0	J	—	—
Calcium	2013		10813		8573		2889		8220	
Chromium	13.7	J	22.8	J	48.4	J	46.6	J	8.2	J
Cobalt	8.5		10.5	B	19.9		25.9		7.6	B
Copper	14.8	J	21.2	J	22.2	J	9.0	J	8.7	J
Iron	7976		16511		13929		10046		17630	
Lead	32.0		69.2		97.6		67.8		11.7	
Magnesium	1371		1975		1953		1271		2987	
Manganese	673	J	955	J	1712	J	1396	J	627	J
Nickel	16.4	J	29.1	J	55.2	J	65.1	J	13.4	J
Potassium	283		401		339		248		545	
Selenium	0.64	B	0.97	B	1.7		1.8		0.33	B
Silver	—	—	—	—	—	—	0.13	J	—	—
Sodium	56.1	J	106	J	82.5	J	50.0	J	53.1	J
Thallium	0.13	J	0.17	J	0.29	J	0.31	J	0.07	J
Vanadium	17.6	J	21.8	J	40.2	J	61.3	J	12.3	J
Zinc	67.8	J	154	J	275	J	267	J	45.2	J

Notes:

All units are mg/Kg.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

--- indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], J - qualified results, or B - qualified results) are shown.

(blank space) - Acceptable (Quantitative) Data

J - Estimated (Subquantitative) Data

B - Acceptable (Quantitative) Data between IDL and CRDL

TABLE 12b
SUMMARY OF DETECTED CONCENTRATIONS

Matrix: Sediment

TAL Inorganics
MFLBC Phase III
 Nease Site, Salem, Ohio

Parameter	Sample Point SD95-M-5		Sample Point SD95-M-6		Sample Point SD95-M-7		Sample Point SD95-M-8		Sample Point SD95-M-9	
	Lab ID: L9121-4		Lab ID: L9121-3		Lab ID: L9121-2		Lab ID: L9121-1		Lab ID: L9189-12	
	Date Sampled: 9/6/95		Date Sampled: 9/5/95		Date Sampled: 9/5/95		Date Sampled: 9/5/95		Date Sampled: 9/13/95	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Aluminum	4804		4577		2900		3578		6346	
Antimony	---	---	0.20	J	0.27	J	0.28	J	0.29	J
Arsenic	9.0		8.2		5.8		5.0		11.4	
Barium	29.1	J	57.2	J	37.1	J	36.5	J	97.7	J
Beryllium	0.45	J	0.64	J	0.33	J	0.32	J	0.62	J
Cadmium	---	---	3.2	J	---	---	---	---	4.1	J
Calcium	2740		2329		2935		2440		10799	
Chromium	9.1	J	12.4	J	6.4	J	18.8	J	14.9	J
Cobalt	6.9	B	7.2	B	5.3	B	5.5	B	9.4	B
Copper	13.2	J	6.6	J	10.0	J	8.0	J	12.6	J
Iron	18331		20517		16768		17885		12970	
Lead	19.9		14.0		11.6		10.6		22.0	
Magnesium	1960		1304		1670		1642		1984	
Manganese	249	J	471	J	223	J	254	J	668	J
Nickel	13.9	J	19.3	J	12.3	J	14.9	J	22.5	J
Potassium	359		371		412		373		345	
Selenium	0.37	B	0.45	B	0.24	B	0.24	B	0.69	B
Silver	---	---	---	---	---	---	0.19	J	0.18	J
Sodium	82.7	J	182	J	134	J	260	J	328	J
Thallium	0.07	J	0.10	J	---	---	0.10	J	---	---
Vanadium	11.73	J	12.3	J	7.7	J	7.8	J	13.3	J
Zinc	52.8	J	70.7	J	49.3	J	58.6	J	97.2	J

Notes:

All units are mg/Kg.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinstate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

--- indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], J - qualified results, or B - qualified results) are shown.

{blank space} - Acceptable (Quantitative) Data

J - Estimated (Subquantitative) Data

B - Acceptable (Quantitative) Data between IDL and CRDL

TABLE 12b
SUMMARY OF DETECTED CONCENTRATIONS

Matrix Sediment

TAL Inorganics
MFLBC Phase III
Nease Site, Salem, Ohio

Parameter	Sample Point SD95-M-10		Sample Point SD95-M-11		Sample Point		Sample Point		Sample Point	
	Lab ID: L9189-11		Lab ID: L9165-5		Lab ID:		Lab ID:		Lab ID:	
	Date Sampled: 9/13/95		Date Sampled: 9/12/95		Date Sampled:		Date Sampled:		Date Sampled:	
	Result	Qual	Result	Qual	Result		Result		Result	
Aluminum	7917		2908							
Antimony	0.77	J	---	---						
Arsenic	8.8		5.8							
Barium	55.9	J	27.9	J						
Beryllium	0.62	J	0.26	J						
Cadmium	3.7	J	1.5							
Calcium	1656		2008							
Chromium	21.4	J	7.7	J						
Cobalt	10.8		4.7	B						
Copper	5.9	J	9.8	J						
Iron	7255		13881							
Lead	22.0		8.6							
Magnesium	939		1359							
Manganese	363	J	232	J						
Nickel	35.2	J	15.6	J						
Potassium	204		256							
Selenium	0.66	B	0.23	B						
Silver	0.31	J	---	---						
Sodium	230	J	106	J						
Thallium	0.13	J	0.05	J						
Vanadium	17.4	J	7.9	J						
Zinc	139	J	47.1	J						

Notes:

All units are mg/Kg

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

--- Indicates not detected.

Qual column indicates qualifier applied to the result following data validation (see below). In this table, only detected results (unqualified results [blank space in Qual column], J - qualified results, or B - qualified results) are shown.

{blank space} - Acceptable (Quantitative) Data

J - Estimated (Subquantitative) Data

B - Acceptable (Quantitative) Data between IDL and CRDL

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Floodplain Soil

	Sample Point SS95-08A-01 Lab ID: L9189-5 Date Sampled: 9/13/95	Sample Point SS95-08A-02 Lab ID: L9189-7 Date Sampled: 9/13/95	Sample Point SS95-08A-03 Lab ID: L9189-8 Date Sampled: 9/13/95	Sample Point SS95-08B-01 Lab ID: L9189-2 Date Sampled: 9/13/95	Sample Point SS95-08B-02 Lab ID: L9189-3 Date Sampled: 9/13/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	4200 mg/Kg	4200 mg/Kg	3900 mg/Kg	1500 mg/Kg	3600 mg/Kg
Percent Fines	88.2 %	79.5 %	65.0 %	40.3 %	81.4 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix Floodplain Soil

	Sample Point SS95-08B-03 Lab ID. L9189-4 Date Sampled: 9/13/95	Sample Point SS95-10-01 Lab ID L9165-6 Date Sampled 9/12/95	Sample Point SS95-10-02 Lab ID L9165-7 Date Sampled 9/12/95	Sample Point SS95-10-02FD Lab ID. L9165-23 Date Sampled: 9/12/95	Sample Point SS95-10-03 Lab ID: L9165-8 Date Sampled: 9/12/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	6600 mg/Kg	5300 mg/Kg	1700 mg/Kg	1900 mg/Kg	5100 mg/Kg
Percent Fines	90.7 %	81.9 %	38.7 %	40.2 %	87.2 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Floodplain Soil

	Sample Point SS95-11-01 Lab ID: L9165-1 Date Sampled: 9/12/95	Sample Point SS95-11-02 Lab ID: L9165-2 Date Sampled: 9/12/95	Sample Point SS95-11-03 Lab ID: L9165-3 Date Sampled: 9/12/95	Sample Point SS95-12-01 Lab ID: L9165-11 Date Sampled: 9/11/95	Sample Point SS95-12-02 Lab ID: L9165-12 Date Sampled: 9/11/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	3800 mg/Kg	1400 mg/Kg	700 mg/Kg	1900 mg/Kg	2900 mg/Kg
Percent Fines	65.6 %	66.2 %	55.9 %	52.1 %	58.1 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Floodplain Soil

	Sample Point SS95-12-03 Lab ID: L9165-14 Date Sampled: 9/11/95	Sample Point SS95-12-04 Lab ID: L9165-15 Date Sampled: 9/11/95	Sample Point SS95-14-01 Lab ID: L9121-13 Date Sampled: 9/7/95	Sample Point SS95-14-01FD Lab ID: L9121-14 Date Sampled: 9/7/95	Sample Point SS95-14-02 Lab ID: L9121-12 Date Sampled: 9/7/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	600 mg/Kg	1900 mg/Kg	3500 mg/Kg	6100 mg/Kg	2800 mg/Kg
Percent Fines	11.8 %	47.3 %	83.7 %	82.2 %	69.6 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix Floodplain Soil

	Sample Point SS95-14-03 Lab ID L9121-11 Date Sampled: 9/7/95	Sample Point SS95-23-01 Lab ID L9124-6 Date Sampled: 9/8/95	Sample Point SS95-23-02 Lab ID L9124-7 Date Sampled 9/8/95	Sample Point SS95-23-03 Lab ID L9124-4 Date Sampled 9/8/95	Sample Point SS95-23-04 Lab ID L9124-5 Date Sampled: 9/8/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	4500 mg/Kg	7200 mg/Kg	6300 mg/Kg	3000 mg/Kg	3200 mg/Kg
Percent Fines	90.8 %	80.9 %	91.4 %	64.8 %	80.4 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Floodplain Soil

	Sample Point SS95-24-01 Lab ID: L9124-1 Date Sampled: 9/8/95	Sample Point SS95-24-02 Lab ID: L9124-2 Date Sampled: 9/8/95	Sample Point SS95-24-03 Lab ID: L9124-3 Date Sampled: 9/8/95	Sample Point SS95-26A-01 Lab ID: L9165-9 Date Sampled: 9/11/95	Sample Point SS95-26A-02 Lab ID: L9165-10 Date Sampled: 9/11/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	6200 mg/Kg	2900 mg/Kg	14600 mg/Kg	7300 mg/Kg	5900 mg/Kg
Percent Fines	82.9 %	39.4 %	87.7 %	81.2 %	93.3 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Floodplain Soil

	Sample Point SS95-26A-02FD Lab ID: L9165-19 Date Sampled 9/11/95	Sample Point SS95-26A-03 Lab ID L9165-24 Date Sampled 9/11/95	Sample Point SS95-26B-01 Lab ID. L9165-20 Date Sampled 9/11/95	Sample Point SS95-26B-02 Lab ID. L9165-21 Date Sampled: 9/11/95	Sample Point SS95-26B-03 Lab ID. L9165-22 Date Sampled: 9/11/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	8300 mg/Kg	3400 mg/Kg	10700 mg/Kg	7700 mg/Kg	4700 mg/Kg
Percent Fines	94.3 %	56.5 %	63.5 %	91.9 %	77.6 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix Sediment

	Sample Point SD95-08A-01 Lab ID: L9189-6 Date Sampled: 9/13/95	Sample Point SD95-08B-01 Lab ID: L9189-1 Date Sampled: 9/13/95	Sample Point SD95-08B-01FD Lab ID: L9189-10 Date Sampled: 9/13/95	Sample Point SD95-10-01 Lab ID: L9165-4 Date Sampled: 9/12/95	Sample Point SD95-12-01 Lab ID: L9165-13 Date Sampled: 9/11/95
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	900 mg/Kg	2000 mg/Kg	700 mg/Kg	700 mg/Kg	600 mg/Kg
Percent Fines	11.0 %	7.9 %	7.7 %	5.9 %	6.1 %

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 13
ANALYTICAL CHEMISTRY RESULTS
MFLBC Phase III - TOC & Percent Fines
 Nease Site, Salem, Ohio

Matrix: Sediment

	Sample Point SD95-12-01FD Lab ID: L9165-17 Date Sampled 9/11/95	Sample Point Lab ID: Date Sampled.	Sample Point Lab ID: Date Sampled	Sample Point Lab ID: Date Sampled.	Sample Point Lab ID: Date Sampled.
Parameter	Result	Result	Result	Result	Result
Total Organic Carbon	300 mg/Kg				
Percent Fines	7.5 %				

Notes:

Percent Fines is the percentage of silt and clay sized particles contained in the sample. Grain size analysis results are reported in the Description of Soils table.

Sample points are identified by unique sets of characters. Each character set is divided into three sections. The first section indicates the medium - sediment (SD), floodplain soil (SS), or Rinsate Blank (RB), and the year sampled (95). The second section indicates the transect number. The third section indicates the sample location number along the transect. In some cases, the third section contains the letters FD, which indicate a field duplicate.

TABLE 14
PHYSICAL DESCRIPTIONS OF FLOODPLAIN SOILS AND SEDIMENTS
MFLBC PHASE III
NEASE SITE, SALEM, OHIO

<u>RNC Sample ID</u>	<u>Lab Sample ID</u>	<u>Description of Sample</u>	<u>Percent Gravel</u>	<u>Percent Sand</u>	<u>Percent Silt- and Clay-Sized Particles</u>	<u>Percent Silt- Sized Particles</u>	<u>Percent Clay- Sized Particles</u>
SD95-08A-01	L9189-6.3	gray poorly graded sand with silt	3.6	85.4	11.0	9.1	1.9
SD95-08B-01	L9189-1.3	light brown poorly graded sand with silt & gravel	20.6	71.4	7.9	6.5	1.5
SD95-08B-01FD	L9189-10.3	medium brown poorly graded sand with silt & gravel	27.1	65.3	7.7	6.0	1.6
SD95-10-01	L9165-4.4	gray poorly graded sand with silt	9.1	85.0	5.9	4.8	1.1
SD95-12-01	L9165-13.1	medium brown poorly graded sand with silt	0.4	93.5	6.1	5.3	0.8
SD95-12-01FD	L9165-17.2	light brown poorly graded sand with silt	0.7	91.8	7.5	6.0	1.5
SS95-08A-01	L9189-5.1	dark brown clayey silt	0.0	11.8	88.2	67.6	20.6
SS95-08A-02	L9189-7.3	medium brown sandy silt	0.0	20.5	79.5	66.6	12.9
SS95-08A-03	L9189-8.2	light brown sandy silt	0.0	35.0	65.0	55.6	9.4
SS95-08B-01	L9189-2.3	medium brown silty sand	0.1	59.6	40.3	33.2	7.1
SS95-08B-02	L9189-3.4	medium brown clayey silt with sand	0.0	18.6	81.4	65.8	15.6
SS95-08B-03	L9189-4.2	medium brown silt	0.0	9.3	90.7	78.2	12.5
SS95-10-01	L9165-6.2	medium brown silt with sand	0.0	18.1	81.9	70.3	11.6
SS95-10-02	L9165-7.1	dark brown silty sand	0.0	61.3	38.7	29.3	9.4
SS95-10-02FD	L9165-23.3	dark brown silty sand	0.0	59.8	40.2	31.9	8.3
SS95-10-03	L9165-8.2	medium brown silt	0.0	12.8	87.2	70.8	16.4
SS95-11-01	L9165-1.4	dark brown sandy silt	0.0	34.4	65.6	56.2	9.4
SS95-11-02	L9165-2.1	dark brown sandy silt	0.0	33.8	66.2	56.0	10.2
SS95-11-03	L9165-3.2	light brown sandy silt	5.3	38.8	55.9	50.4	5.5
SS95-12-01	L9165-11.4	medium brown silt with sand	0.2	47.7	52.1	41.8	10.3
SS95-12-02	L9165-12.4	medium brown sandy silt	0.2	41.7	58.1	49.6	8.5
SS95-12-03	L9165-14.3	medium brown poorly graded sand with silt	0.4	87.8	11.8	8.5	3.3
SS95-12-04	L9165-15.1	medium brown silty sand	5.8	46.9	47.3	36.3	11.0
SS95-14-01	L9121-13.1	medium brown silt with sand	0.0	16.3	83.7	73.4	10.3
SS95-14-01FD	L9121-14.2	medium brown silt with sand	0.1	17.8	82.2	72.0	10.1
SS95-14-02	L9121-12.3	dark brown sandy silt	0.0	30.4	69.6	60.7	8.9
SS95-14-03	L9121-11.2	medium brown silt	0.1	9.1	90.8	79.8	11.0
SS95-23-01	L9124-6.3	dark brown silt with sand	3.0	16.1	80.9	66.7	14.2
SS95-23-02	L9124-7.2	dark brown silt	0.0	8.6	91.4	71.5	19.9
SS95-23-03	L9124-4.3	medium brown sandy silt	7.1	28.2	64.8	51.5	13.2
SS95-23-04	L9124-5.3	medium brown silt with sand	4.1	15.5	80.4	66.1	14.3
SS95-24-01	L9124-1.2	medium brown silt with sand	0.0	17.1	82.9	69.6	13.3
SS95-24-02	L9124-2.2	medium brown silty sand	0.0	60.6	39.4	29.7	9.7

TABLE 14
PHYSICAL DESCRIPTIONS OF FLOODPLAIN SOILS AND SEDIMENTS
MFLBC PHASE III
NEASE SITE, SALEM, OHIO

<u>RNC Sample ID</u>	<u>Lab. Sample ID</u>	<u>Description of Sample</u>	<u>Percent Gravel</u>	<u>Percent Sand</u>	<u>Percent Silt- and Clay-Sized Particles</u>	<u>Percent Silt- Sized Particles</u>	<u>Percent Clay- Sized Particles</u>
SS95-24-03	L9124-3.1	dark brown silt	0.0	12.3	87.7	70.1	17.6
SS95-26A-01	L9165-9.2	medium brown silt with sand	1.8	17.0	81.2	59.9	21.3
SS95-26A-02	L9165-10.2	medium brown silt	0.0	6.7	93.3	70.4	22.9
SS95-26A-02FD	L9165-19.3	medium brown clayey silt	0.0	5.7	94.3	68.8	25.5
SS95-26A-03	L9165-24.2	medium brown sandy silt	11.6	31.9	56.5	47.4	9.1
SS95-26B-01	L9165-20.1	light brown sandy silt	14.5	21.9	63.5	51.0	12.6
SS95-26B-02	L9165-21.2	dark brown clayey silt	0.0	8.1	91.9	74.4	17.5
SS95-26B-03	L9165-22.2	medium brown sandy silt	0.0	22.4	77.6	66.2	11.4

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

SAMPLE LOCATION**DESCRIPTION**

SD95-M-1

This sample point was located in the MFLBC, approximately 150 feet downstream (north) from a 5-foot diameter culvert that passes under Pennsylvania Avenue. At this sample location, a sediment sample was collected 10 feet downstream from a riffle for metals analysis only.

In this section of the MFLBC, the creek spans 5 to 6 feet in width and up to 1 and 1/2 feet in depth as it meanders between ten feet high slopes that lead to surrounding uplands. Several crayfish and minnows, along with a caddisfly larva, were observed in the creek in the vicinity of the sampling point. Trash and building debris also was observed in the creek and along its banks. The creek banks rise 2 to 3 feet above the water surface and lead to a narrow floodplain densely vegetated with wetland grasses and forbs. None of the slopes, dense stands of Japanese knotweed (an introduced noxious weed) have become established in several places. Several willow trees growing on the slopes provide less than 10 percent shade cover for the creek. On the western upland, an area of light industrial land use extends to within 50 to 100 feet of the creek corridor. Rubble and anthropogenic fill was observed where the industrial facility borders the creek corridor. On the eastern upland, an abandoned field extends to the east from the creek corridor.

SD95-M-2

This sample point was located in the MFLBC, 250 feet southeast of State Highway Route 45 (Route 45). At this sample location, a primary and a field duplicate sediment sample were collected approximately 2 feet downstream (northwest) from a small, 2- to 4-foot-wide island along the western bank of the creek for metals analysis only.

This section of the creek, situated within a large emergent/scrub/shrub wetland, is 15 feet wide and 1 1/2 to 3 feet deep. Numerous fish greater than 3 inches in length were observed in the vicinity of the sample location. Three-foot banks bound the creek and lead to broad floodplains vegetated with grasses and several herbaceous species, as well as willow and maple trees. Vegetation adjacent to the creek provides less than ten percent shade. About 10 feet downstream of the sample location, a small feeder stream enters the creek, and 15 feet downstream from the sample location an old beaver dam has promoted the formation of a large ponded area on the slow-moving, meandering creek.

During sample point selection and collection, a slight sheen was observed on the water surface. Sheets of plywood were observed on the creek bottom in the vicinity of the sample location. Along the southwest side of the creek, in the vicinity of the small feeder stream, large piles of soil have been placed in the wetlands. Several additional piles located about 300 feet to the west appear to be staged for later placement in the wetlands.

A light industrial facility on the western floodplain extends to within 300 feet of the creek. At some time in the past a large amount of rubble and anthropogenic fill had been dumped in the area where the industrial facility abuts the floodplain. The densely vegetated eastern floodplain supports facultative wetland species including red maple and willow tree saplings.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

SD95-M-3

This sample point was located in the MFLBC about 430 feet downstream (northwest) from Route 45. At this sample location, a sediment sample was collected near the northeastern bank of the creek for metals analysis only.

This calm and slow-moving section of the creek is 8 to 10 feet wide and 6 to 12 inches deep. Young willow trees and reed canary grass line the 2-foot banks and provide approximately 10 percent shade cover. Gradually sloping floodplains exist on both sides of the creek. The northeastern floodplain is a broad wetland densely vegetated with grasses and trees. To the southwest, beyond a 5-foot buffer zone of herbaceous vegetation along the creek bank, the floodplain is maintained as a grass field. A small sewerage pumping station is located 50 feet southwest of the creek. The reed canary grass growing in the area may have become established as a result of restoration activities associated with installation of the pumping station. Plastic bottles and miscellaneous urban trash were observed in the creek upstream from the sample point. Approximately 15 feet upstream from the sample point, a large riveted tank railcar (determined by the cutoff access opening along one side) that is open at both ends sits parallel to the creek banks in the middle of the creek.

SD95-M-4

This sample point was located in an intermittent tributary that drains the forested eastern floodplain of the MFLBC. The sediment sample was collected approximately 200 feet upstream of the tributary's confluence with MFLBC, which is upstream from the Salem Wastewater Treatment Plant. The sediment sample was collected for metals analysis only.

The tributary channel is 2 to 4 feet wide. The channel was dry at the time of sampling, but many crayfish holes lined the banks in the vicinity of the sample point. The eroded banks of the tributary slope to a height of 4 feet above the channel and merge with a forested upland that provides 80 to 90 percent shade cover. The intermittent drainageway barely meets the definition of a wetland and no wetlands were observed along either bank of the drainageway from the sample location all the way downstream to the drainageway confluence with MFLBC.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

SD95-M-5	<p>This sample point was located in the Golf Course Tributary, which joins the MFLBC downstream from the Salem Wastewater Treatment Plant, approximately 430 feet east of Allen Road. A sediment sample was collected approximately 50 feet upstream (southeast) of the railroad tracks for metals analysis only.</p> <p>The tributary is 8 to 10 feet wide and 2 to 3 feet deep in this area. The 15- to 20-foot-high banks rise steeply and lead to broad, flat sparsely vegetated uplands. Trees (including several dead box elders and willows) along with other herbaceous vegetation, cover the banks and provide 20 to 40 percent shade cover. An inactive beaver dam located 15 feet downstream from the sample point has stagnated the flow of water near the sample location. Partially buried, rusted drums were observed on the downstream side of the dam. Casting sand had been dumped along the western bank and extended as much as ten feet down the bank. Concrete debris also was observed on the bank slopes.</p> <p>An office building is located on the eastern upland beyond a 50-foot wide field of mown grass. The western upland area is composed of fill material, and casting sand covers most of the western upland surface. The vegetation is composed of sparse patches of grass and other infrequent stands of woody vegetation, including a number of dead trees.</p>
SD95-M-6	<p>This sample point was located in the MFLBC, downstream (northwest) from the Salem Wastewater Treatment Plant (SWWTP) and approximately 250 feet upstream (southeast) of the MFLBC's confluence with the Golf Course Tributary. At this sample location, a sediment sample was collected for metals analysis only.</p> <p>This section of the creek is 8 to 10 feet wide and 4 to 6 inches deep. The creek meanders through a 15- to 20-foot wide corridor surrounded by steep 3- to 4- foot high banks. The uninundated sediment bars on the corridor floor are vegetated with herbaceous plants. Several fallen trees span the creekbed both upstream and downstream of the sample location. No wetlands were observed beyond the banks of the creek. Trees growing along the banks provide approximately 50 percent shade cover. To the southwest, beyond a wooded area about 50 feet wide, a field extends to the edge of the SWWTP; a rifle range has been established in a portion of the field. To the northeast a broad forested floodplain extends northeast for more than 200 feet.</p>

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

SD95-M-7	<p>This sample point was located in the MFLBC approximately 150 feet downstream from MFLBC's confluence with the Golf Course Tributary. At this sample location, a sediment sample was collected for metals analysis only.</p> <p>This slow-moving section of the creek is 10 feet wide and 4 to 6 inches deep. The creekbed is 20 feet wide and surrounded by banks that rise 2 to 3 feet above the water surface. Trees along the banks provide 40 to 60 percent shade cover. No wetlands were observed beyond the banks. A broad, flat, forested floodplain stretches to the east and a 40- to 50-foot high forested landfill borders to the west. With trash evident on the surface, the landfill is apparently uncapped.</p>
SD95-M-8	<p>This sample point was located in the MFLBC approximately 300 feet upstream (southeast) from the culverts that pass under Allen Road. A sediment sample was collected for metals analysis only.</p> <p>This section of the creek is 10 to 15 feet wide and 6 to 8 inches deep. A frog was seen near the sample location but was unidentifiable due to lack of daylight. Fish were observed on the upstream side of the three culverts that pass under Allen Road. The creek flows slowly between steep 4- to 5-foot high banks that lead to forested floodplains. Trees adjacent to the creek provide approximately 80 percent shade cover. The floodplains apparently flood infrequently and support a mixture of facultative wetland and facultative upland groundcover and tree species. Most of the trees appeared to be less than 40 years old. To the northeast, the forested floodplain extends about 200 feet before merging with abandoned agricultural field. To the southwest, the forested floodplain extends for more than 200 feet.</p> <p>Numerous small ditches in the eastern floodplain run perpendicular to the creek and direct flow from agricultural fields into the creek. Also in this area, a number of soil piles were observed adjacent to the creek. Based on the sheerness of the creek's banks and the apparent lack of erosion in the area (based on the presence of trees rooted in the creek banks), the soil piles on the eastern floodplain may be indicative of historical dredging activities.</p>

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

SD95-M-9	<p>This sample point was located in the MFLBC, west of the intersection of Allen Road and Beechwood Road, and approximately 30 feet downstream (north) from a private driveway bridge. A sediment sample was collected for metals analysis only.</p> <p>The creek is approximately 10 feet wide and 6 to 12 inches deep in this section. Herbaceous vegetation grows in the uninundated portions of sediment bars that have developed parallel to flow within the channel. Steep banks, supported by 5-foot high concrete retaining walls in the vicinity of the bridge, are about 8 feet high and lead to broad, flat floodplains vegetated with herbaceous plants and some trees. Although the banks are eroded, flooding above the banks appears to occur infrequently. No trees are present to shade the creek in the vicinity of the sample location. Eight- to 10-foot high stands of Japanese knotweed cover the top of the western bank and portions of the eastern bank throughout the section. About 15 feet downstream of the sample location, a portion of the concrete wall supporting the eastern bank has cracked and partially collapsed.</p>
Transect SS95-08A and associated samples	<p>This transect was located about 500 feet downstream (north) from Route 45, and about 300 feet west of Kent Road. Three floodplain soil samples and one sediment sample were collected along this transect for MPK, TOC, and GS analyses.</p> <p>Meandering and slow-moving, this section of the MFLBC is 15 to 20 feet wide and 4 to 12 inches deep. Trees along the creek provide 70 to 80 percent shade cover. To the west the eroded bank rises steeply 2 to 3 feet above the water surface and supports dense stands of rice cut grass and other herbaceous species. A forested floodplain extends westward. To the east the eroded bank rises steeply 1 to 2 feet and leads to a 50-foot forested zone of scattered facultative vegetation; beyond this zone, an abandoned agricultural field extends eastward to Road. Based on the presence of piled drift debris and some scouring, the area appears to flood occasionally.</p> <p>Sample SS95-08A-01 was collected from the forested floodplain on the western side of the creek. The soil, a dark brown clayey silt, was sampled for mirex, photomirex, and kepone (MPK), total organic carbon (TOC), and grain size (GS) analyses. Facultative upland tree and groundcover species dominated. The scoured appearance of the hillock above the sample location, along with the sparsity of groundcover and presence of debris, indicates frequent flooding in the area. Vegetation in the area was estimated to range from 1 to 20 years in age.</p> <p>Sample SS95-08A-02, a medium brown sandy silt, was collected from the forested floodplain on the western side of the creek. Soil was sampled for MPK, TOC, and GS analyses. Facultative upland tree and groundcover species</p>

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-08A and associated samples, continued

dominate. Overstory vegetation was estimated to be from 1 to 20 years old. Understory vegetation was estimated to be from 2 to 3 years old.

SD95-08A-01 was collected near the undercut western bank of the creek, approximately 20 feet downstream of a fallen log and 25 feet upstream of a gravel bar in the creek. Water was 6 inches deep. At this location, the sediment (a gray poorly graded sand with some silt) was sampled for MPK, TOC, and GS analyses. A separate sediment sample, SD95-M-10, was collected from the same vicinity for metals analysis.

Sample SS95-08A-03, a light brown sandy silt collected from the forested floodplain on the eastern side of the creek, was sampled for MPK, TOC, and GS analyses. Facultative herbaceous species covered 70 percent of the ground surface. Of the trees present in the vicinity of the sample location, box elder was the predominant species. One 4-inch (DBH) cherry and one 4-inch (DBH) elm also were observed.

Transect SS95-08B and associated samples

The transect was located 750 feet northwest of Kent Road and 500 feet west of Goshen Road. three floodplain soil samples and one sediment sample were collected along this transect for MPK, TOC, GS, and SVOC analyses. A field duplicate was collected at SD95-08B-01.

The channel in this section of the MFLBC is 15 to 20 feet wide and 2 to 15 inches deep. The tops of the slightly eroded creek banks rise approximately 3 feet above the water surface and are densely vegetated with grasses and other facultative herbaceous species. A number of trees, including a basswood and several elms, are present on the floodplain near the banks and increase in number further from the creek. To the northwest, a forested floodplain extends at least 200 feet before being interrupted by a cleared area, apparently a utility line right-of-way. The forested floodplain then continues to the northwest. To the southeast, a very narrow (10-foot wide) floodplain merges into a steep, 15-foot high forested slope.

Sample SS95-08B-01, a medium brown silty sand collected from a low-lying area on the northwestern floodplain was collected for MPK, TOC, GS and semivolatile (SVOC) analyses. The area supports a dense community of facultative wetland herbaceous and shrub/scrub species such as wool grass, joepy-weed, cattails, burreed, arrowhead tearthumb, turtlehead, and silky dogwood. The sample location appeared to be on a cleared right-of-way for utility lines.

Sample SS95-08B-02, a medium brown clayey silt with some sand located in a forested area of the northwestern floodplain, was collected for MPK, TOC, GS and SVOC analyses. The area supports several facultative wetland

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-08B and associated samples, continued

herbaceous and tree species, such as sensitive fern, box elder, and willow. Several facultative upland plants, including raspberry species and black cherry trees also are present. Water-stained ~~Stained~~ leaves were observed throughout the area.

The sediment sample SD95-08B-01, a light brown poorly graded sand with some silt, was collected from the creek near the northwestern bank, 15 feet downstream (northeast) from a fallen log and 20 feet upstream (southwest) from several other fallen trees and a gravel bar. A primary sediment sample and a field duplicate were collected for MPK, TOC, GS, and SVOC analyses.

Sample SS95-08B-03, a medium brown silt, was collected from the narrow forested southeastern floodplain about 5 feet southeast of the creek, near the base of a 15-foot high, steeply-rising slope. Soil was collected for MPK, TOC, GS and SVOC analyses. Various species of herbaceous plants such as jewelweed, false nettle, and sneezeweed, as well as one beech tree, were observed growing on the floodplain. Numerous trees, including several cherry trees, recently had been cut down and left where they had fallen on the floodplain and along the slope.

Transect SS95-10 and associated samples

The transect of the MFLBC was located approximately 2,750 feet south of Middletown Road and 1,750 feet west of a cleared, grassed, natural gas pipeline right-of-way that runs perpendicular to Middletown Road. Three floodplain soil samples and one sediment sample were collected along this transect for MPK, TOC, GS, and SVOC analyses. A sediment sample was also collected for metals analysis. Also, at SS95-10-02, a field duplicate was collected.

This reach of the meandering, slow-moving creek is 10 to 12 feet wide and 4 to 24 inches deep. From an area 30 feet upstream (southwest) to a bend in the creek, the northwestern bank slopes gradually to form a relatively flat, narrow (10- to 20-foot wide) floodplain, which is covered with dense herbaceous vegetation. the floodplain ends abruptly at the base of a sharply rising slope that extends for at least 15 vertical feet. The transect was located about 10 feet south of the flatter area. Further upstream and downstream of this flatter, more open area, the eroded northwestern bank rises 1 to 2 feet above the water and leads to a narrow forested floodplain and subsequent steep rise. On the southeastern side of the creek, the eroded bank rises 3 to 5 feet above the water and leads to a broad, forested floodplain. In the vicinity of the transect, the trees along the banks provide the creek with 10 to 20 percent shade cover; further upstream and downstream of the bend, the trees provide higher percentages of cover. A blue heron was observed leaving the area as samplers approached.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-10 and associated samples, continued

Soil sample SS95-10-01, a medium brown silt with sand, was collected about 50 feet from the creek, on the narrow northwestern floodplain near the base of the steep rise. Soil was collected for MPK, TOC, GS, and SVOC analyses. Several large elm trees on the floodplain and numerous other trees of various ages on the upgradient slope provide 90 percent shade cover. Several facultative herbaceous species are growing sparsely on the forest floor, which is covered with water-stained leaves.

The samples SD95-10-01, a gray poorly graded sand with silt (analyzed for MPK, TOC, GS, and SVOC analyses), and SD95-M-11 (analyzed for TAL metals analysis only) were collected 15 feet upstream from the bend in the creek, near the northwestern edge of the creek and the narrow floodplain covered with herbaceous vegetation.

SS95-10-02, a dark brown silty sand, was collected from the forested floodplain southeast of the creek and analyzed for MPK, TOC, GS, and SVOC analyses. A field duplicate also was collected. Red maples predominate the overstory. The understory is comprised of numerous species of tree saplings and several species of facultative and facultative upland herbaceous plants. Water-stained leaves and snagged organic debris on the forest floor indicate that flooding occurs occasionally in the area. A toad was observed near this sample location.

At SS95-10-03, a medium brown silt located east of the creek on the forested floodplain, was collected for MPK, TOC, GS, and SVOC analyses. The habitat is similar to that of SS95-10-02, although herbaceous vegetation was observed to be sparser at this greater distance from the creek.

Transect SS95-11

This transect crossed the MFLBC and surrounding forested floodplain approximately 1500 feet south of Middletown Road and 625 feet east of a gas pipeline right-of-way that ran perpendicular to Middletown Road. Three floodplain soil samples were collected along this transect for MPK, TOC, and GS analyses.

Along this reach the slow-moving creek is fairly straight, 15 to 20 feet wide, and 6 to 12 inches deep. Numerous cobbles, stones, and boulders were visible throughout the creekbed. To the east of the creek, the land slopes gradually for several feet then rises sharply to an elevation of 10 to 15 feet. The land is forested, and some tree roots along the slope have been exposed by erosion. To the west of the creek, the bank rises 2 to 3 feet above the water surface and levels off into a broad, forested floodplain.

At sample location SS95-11-01, a dark brown sandy silt located on the western floodplain, was collected for MPK,

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-11, continued

TOC, and GS analyses. Shagbark hickory, black cherry, and beech trees, along with several large red oak trees, provide 80 to 90 percent shade coverage. Numerous saplings also are present. Herbaceous species include lady fern, Solomon's Seal, and maple leaf viburnum. Water- and sediment-stained leaves observed on the forest floor, and several scoured flood channels observed near the sample location indicate that flooding occurs frequently in the area.

Sample SS95-11-02, a dark brown sandy silt, was collected from the western floodplain for MPK, TOC, and GS analyses. Numerous large hickory, red maple, and ironwood trees provide 80 to 90 percent shade cover in the area of the sample location. Maple leaf viburnum and cherry saplings are scattered throughout the understory landscape. Water- and sediment-stained leaves and scoured flood channels were observed in the area, as well as snagged debris and exposed roots, all of which are indicative of flooding.

Sample SS95-11-03, a light brown sandy silt, was located approximately 10 feet east of the edge of the creek, on the lower reach of the sloping bank. Soil samples were collected for MPK, TOC, and GS analyses. Elm and red maple trees growing on the flat and the slope provide seventy percent shade cover to the area. The sparse herbaceous vegetation in the area is composed mainly of tree seedlings. Tree roots visible on the scoured slope indicate the occurrence of severe erosion.

Transect SS95-12 and associated samples

This transect crossed the MFLBC behind a recreational vehicle dealership on the western side of State Route 45, and about 300 feet downstream (north) of a bridge for a private driveway. Four floodplain

samples and one sediment sample were collected for MPK, TOC, GS, and SVOC analyses. A field duplicate was collected at SD95-12-01.

The creek is 8 to 12 feet wide and 6 to 18 inches deep along this reach. The banks of the creek, which rise 3 to 4 feet above the water surface, are densely vegetated with grasses. Broad floodplains that extend to the east and west support dense herbaceous vegetation (mainly grasses) and scattered trees.

Sample SS95-12-01, a medium brown silt with some sand, was located on the grassy western floodplain, where soil samples were collected for MPK, TOC, and GS analyses. Several large trees, including black willows, are growing in the area.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-12 and associated samples

SS95-12-02, a medium brown sandy silt, was located approximately 10 feet from the western bank of the creek. Soil samples were collected for MPK, TOC, and GS analyses. Grasses, jewelweed, smartweed, sneezeweed, and other herbaceous plants cover the ground. Several large black willow trees and numerous saplings are growing in the vicinity of the sample point.

Sediment sample SD95-12-01, a medium brown poorly graded sand with some silt, was located about 10 feet downstream of a riffle area. Sediment samples were collected for MPK, TOC, and GS analyses. A field duplicate was collected.

At SS95-12-03, a medium brown poorly graded sand with some silt located on the eastern bank, on a small peninsula, was collected for MPK, TOC, and GS analyses. The peninsula, separated from the floodplain by a 1 to 1 1/2-foot wide ditch, is densely vegetated with grasses and several shrubs.

Sample SS95-12-04, a medium brown silty sand, was located on the eastern floodplain, near the edge of a grassed, open area. Soil samples were collected for MPK, TOC, and GS. Sneezeweed and New York ironweed are scattered throughout the area, along with several black walnut trees and an apple tree. A groundhog hole was observed nearby the sample location.

Transect SS95-14 and associated samples

The transect crossed the MFLBC approximately 2,500 feet east of State Route 45. The creek is 10 to 15 feet wide and 6 to 12 inches deep, with 3- to 4-foot banks. Three floodplain soil samples were collected along this transect for MPK, TOC, and GS analyses. A field duplicate was collected. On the northern floodplain, a 100-foot swath of emergent wetland supports numerous willow trees and dense understory vegetation. Beyond the emergent wetland, a forested floodplain extends approximately 140 feet and supports trees such as American elm, alder, and black walnut. The floodplain then dips slightly to form a 30- to 40-foot wide wetland depression before rising to form a small hill, as forested floodplain merges with upland forest. On the southern floodplain the land gradually slopes upward and is covered with herbaceous vegetation. Approximately 90 feet from the bank, dense stands of raspberry species have become established. Further upslope, tree species including black cherry, black locust, and box elder comprise a 20- to 30-foot wide swath of forest that leads to a meadow.

Sample SS95-14-01, a medium brown silt with some sand, was located on the northern bank of the creek, in the wetland depression that exists near the floodplain-upland boundary. Soil samples were collected for MPK, TOC, and

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-14 and associated samples, continued

GS analyses. A field duplicate was collected. Vegetation in the vicinity included turtleheads and other obligate wetland herbaceous species.

Sample SS95-14-02, a dark brown sandy silt, was located on the edge of an emergent wetland area near the creek. Soil was collected for MPK, TOC, and GS analyses. The area supports facultative wetland herbaceous plants such as reed canary grass and three species of smartweed, as well as several willow trees.

Sample SS95-14-03, a medium brown silt, was located on a densely vegetated marginal wetland, from which soil samples were collected for MPK, TOC, and GS analyses. The area is predominated by facultative wetland herbaceous species such as New York ironweed, tearthumb, jewelweed, reed canary grass, and willow herb. Several facultative upland herbaceous species, including thistle and teasel also were observed. Collapsed rodent burrows were observed near the sample location.

Transect SS95-24

The transect was located on the MFLBC approximately 50 feet southwest of the intersection of State Highway Alternate 14 and Lisbon Road. Three floodplain soil samples were collected along this transect for MPK, TOC, and GS analyses.

The creek is 10 to 15 feet wide and at least 3 feet deep in this section. The northeastern creek bank rises 3 to 4 feet above the water surface and levels off to a narrow (5- to 10-foot wide) forested floodplain where several large willow trees and a silver maple tree were observed. The floodplain terminates at the base of the berm for Alternate Route 14, which rises 10 to 15 feet to the road surface. The berm is composed of fill material including concrete, tires, macadam, wood, and items that appear to be asbestos blocks, as well as soil. The southwestern creek bank, which rises 2 to 3 feet above the water surface, supports stands of Japanese knotweed that extend several feet onto the floodplain, along with numerous large willow trees. Beyond the Japanese knotweed, the floodplain becomes a broad, saturated, densely vegetated marsh predominated by broad- and narrow-leafed cattails, along with several stands of bulrushes and wool grass. Common reed and Japanese knotweed were observed growing along the northern margin of the marsh.

Sample SS95-24-01, a medium brown silt with some sand, was located on the narrow forested northern floodplain of the creek. Soil was collected for MPK, TOC, and GS analyses. Little ground cover was observed in this area. Trash was scattered throughout this section of the floodplain.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-24, continued

SS95-24-02, a medium brown silty sand with some clay, was collected

from the southern floodplain, in the cattail marsh, and analyzed for MPK, TOC, and GS. A number of silky dogwood and buttonbush shrubs were observed in the vicinity of a dead tree that stands near the sample point.

SS95-24-03, a dark brown silt, was collected from a region of the marsh dominated by narrow-leaved cattails, and at the edge of what apparently is a depression that contains ponded water under normal (non-drought) conditions. Soil was sampled for MPK, TOC, and GS analyses. A translucent, white salt crust was observed along the edge of what would be the ponded area.

Transect SS95-26A

The transect was located on the MFLBC approximately 1,000 feet downstream (south) of the confluence of an unnamed tributary that drains the eastern floodplain of the MFLBC with the MFLBC itself (about 1,500 feet upstream (north) of Butcher Road bridge), and about 400 feet west of Lisbon Road. Three floodplain soil samples were collected along this transect for MPK, TOC, and GS analyses. A field duplicate was collected at SS95-26A-02.

The creek is 10 feet to 15 feet wide and at least 3 feet deep in this section of the creek. The banks rise 3 to 4 feet above the water surface and are overgrown with dense stands of Japanese knotweed. The eastern bank leads to a gradual, upward-sloping forested/scrub-shrub floodplain that extends to Lisbon Road. The western bank leads to a narrow (15 to 20 foot-wide) floodplain covered with Japanese knotweed that abruptly slopes upward to elevations of 15 to 20 feet above the water surface of the creek. The slope, which supports scrub-shrub vegetation may have been built up during sand mining activities that once occurred on the floodplain and upland west of the creek. According to a local resident, mining activities have been abandoned for several years, as evidenced by the growth of vegetation in the area.

Sample SS95-26A-01, a medium brown silt with some sand, was collected from the eastern floodplain of the creek for MPK, TOC, and GS analyses. A dense stand of Japanese knotweed covers the bank; goldenrod, poison ivy, and tree saplings are among the scrub-shrub vegetation that covers the slopes of the floodplain.

Sample SS95-26A-02, a medium brown silt with some clay, was located on the eastern floodplain of the creek, where soil samples were collected for MPK, TOC, and GS analyses. A field duplicate was collected. The ground surface beneath a dense stand of Japanese knotweed and tree saplings surface was sparsely vegetated. Water-stained leaves observed in the vicinity of the sample location indicate occasional flooding.

Sample SS95-26A-03, a medium brown sandy silt, was collected west of the creek on the upward-sloping floodplain

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Transect SS95-26A, continued

for MPK, TOC, and GS analyses. Beyond the dense stand of Japanese knotweed, grasses, goldenrods, poison ivy, several raspberry species, and tree saplings cover the narrow floodplain and adjacent hillside.

Transect SS95-26B

The transect was located approximately 3,000 feet downstream of the point where Butcher Road bridge crosses the MFLBC. Three floodplain soil samples were collected along this transect for MPK, TOC, and GS analyses.

The creek in this section is 6 to 10 feet wide, and 2 to 4 feet deep; the banks rise 2 to 5 feet above the water surface. The western creek bank leads to a slightly elevated stretch of land about 20 feet wide, which supports dense stands of Japanese knotweed that are at least 10 feet wide. Beyond this drier leveed area, a marsh extends to the west about 225 feet before the land slopes upward and becomes a forested upland. The eastern creek bank upstream of the transect supports dense stands of Japanese knotweed, beyond which the floodplain slopes to forested upland. In contrast, about 50 feet upstream and 50 feet downstream from sample location SS95-26B-03, the eastern creek bank is free of Japanese knotweed. The bank leads to a narrow (20- to 50-foot wide) floodplain, which slopes to upland. Supporting pasture grasses and several small stands of trees both floodplain and hillside serve as pasture land.

Sample SS95-26B-01

Sample SS95-26B-01 a light brown sandy silt, was collected from the western floodplain of the creek, near the margin of a cattail marsh and the base of the forested upland slope. Soil was collected for MPK, TOC, and GS analyses. Numerous tree saplings, including box elders and elms, comprised the vegetation on the upland slope, while smartweed, alder, and cattails vegetated the ground surface surrounding the sample location. Standing water was observed less than 10 feet to the east of the sample.

Sample SS95-26B-02

Sample SS95-26B-02, a dark brown clayey silt, was collected from the western floodplain of the creek, about 5 feet west of the dense stands of Japanese knotweed that covered the stretch of land adjacent to the marsh. Soil was collected for MPK, TOC, and GS analyses. A large willow tree is growing about 10 feet to the south of the sample location. Several grass species partially cover the ground surface near the sample location. The unvegetated areas may be indicative of frequent flooding. A large number of frogs inhabit the ponded area directly west of the sample location.

TABLE 15
DESCRIPTION OF HABITATS OBSERVED
IN THE VICINITY OF SAMPLE LOCATIONS
MFLBC PHASE III

Sample SS95-26B-03

Sample SS95-26B-03, a medium brown sandy silt located on the eastern bank of the creek, in the center of the narrow floodplain was collected for MPK, TOC, and GS analyses. The floodplain is dominated by pasture grasses, with several species of smartweed scattered throughout. The overstory is dominated by a very large willow tree (3 feet DBH), located about 5 feet from the sample location. To the east on the slope, several more willows and other tree species shade the floodplain.

TABLE 16
Results of 1991 Remedial Investigation
Sediment and Floodplain Soil Sampling Program: Egypt Swamp

Sample Number	Sediment	Floodplain Soil	Mirex	Photomirex	Kepone
SD91-19A	✓		ND	ND	ND
SD91-20	✓		403	ND	ND
SD91-18	✓		57.5	ND	ND
SD91-19	✓		125	ND	ND
SD91-19B	✓		93.7	ND	ND
SD91-21	✓		45.5	0.479	ND
SD91-22	✓		175	ND	ND
SD91-23	✓		107	2.96	ND
SS-19A-01		✓	ND	ND	ND
SS-19A-02		✓	ND	ND	ND
SS-19A-03		✓	ND	ND	ND
SS-19A-04		✓	25.4	ND	ND
SS-19B-01		✓	52	ND	ND
SS-19B-02		✓	23.9	ND	ND
SS-19B-03		✓	ND	ND	ND
SS-19B-04		✓	ND	ND	ND

• All concentrations are in $\mu\text{g/kg}$;
 ND Not Detected

TABLE 17
Results of 1993 Egypt Swamp
Soil/Sediment Sampling Program:
Mirex, Photomirex, and Kepone

Sample Number	Floodplain Soil	Sediment	Mirex	Photomirex	Kepone
SS93-01	✓		10.4 ^{a,j}	ND ^b	ND
SS93-2A\2B	✓		315	ND	ND
SS93-03	✓		4.4 ^j	ND	ND
SS93-04A/04B	✓		124	2.5 ^j	ND
SS93-05	✓		37.5	ND	ND
SS93-06A/06B	✓		413	4.5 ^j	ND
SS93-07	✓		2.9 ^j	ND	ND
SS93-8A/8B	✓		4080	49.1	56.3 ^j
SS93-09	✓		14.1 ^j	ND	ND
SS93-10A/10B	✓		16.8 ^j	ND	ND
SS93-11A/11B	✓		119	1.4 ^j	ND
SS93-12A/12B	✓		71.9	1.0 ^j	ND
SS93-13B		✓ ^d	3.7 ^j	ND	ND
SS93-014	✓		35.5	ND	ND
SS93-015	✓		514	5.0 ^j	2.3 ^j
SS93-16A/16B	✓		18.7	0.3 ^j	ND
SS93-17A/17B	✓		293	5.3 ^j	7.0 ^j

^a All concentrations are in µg/kg

^j Concentration is below quantitation limits and is an estimate only;
quantitation limits are 18.5 µg/kg mirex, 20.4 photomirex, and 68.0 kepone

^c Not detected

^d Sediment sample from wetland pond, not an MFLBC in-stream sediment sample

TABLE 18
Results of 1993 Egypt Swamp
Soil/Sediment Sampling Program: Total Organic Carbon

Sample Identification	Total Organic Carbon (%)
SS93-01	8.0
SS93-2A\2B	3.6
SS93-03	10.8
SS93-04A/04B	5.2
SS93-05	4.9
SS93-06A/06B	8.4
SS93-07	12.9
SS93-8A/8B	5.3
SS93-09	7.6
SS93-10A/10B	19.6
SS93-11A/11B	7.2
SS93-12A/12B	49.2
SS93-13B	3.7
SS93-014	16.7
SS93-015	8.9
SS93-16A/16B	12.3
SS93-17A/17B	4.0

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FIGURE 5 CHEMISTRY AND ECOLOGICAL INFORMATION (SHEET 4 OF 9)

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FIGURE 9

CHEMISTRY AND ECOLOGICAL INFORMATION (SHEET 8 OF 9)

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Attachment N1

**Indiana Bat Habitat Survey. Middle Fork Little Beaver Creek
Salem, Ohio**

**INDIANA BAT HABITAT SURVEY:
MIDDLE FORK LITTLE BEAVER CREEK
SALEM, OHIO**

Prepared for

Ruetgers-Nease Corporation
State College, Pennsylvania

Prepared by

ENVIRON Corporation
Arlington, Virginia

February 1, 1994
Revised May 23, 1996

CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
A. Status, Biology and Life History of the Indiana Bat	1
B. Habitat Requirements	3
1. Winter Habitat	3
2. Summer Habitat	3
a) Foraging Habitat	3
b) Nursery Roosts	4
II. METHODS	6
A. Field Survey	6
1. Foraging Habitat	7
2. Nursery Habitat	7
B. Ohio EPA Benthic Macroinvertebrate Data	8
III. RESULTS	9
A. Field Survey Results	9
B. Comparison of Potentially Suitable Foraging Habitat Areas with Benthic Macroinvertebrate Data	20
IV. LIMITATIONS OF THE STUDY	21
A. Physical Limitations of Field Observation Methods	21
B. Application Limitations of the Survey	21
V. CONCLUSIONS	22
VI. REFERENCES	23

C O N T E N T S

(continued)

Page

T A B L E S

Table 1: <i>Field Results for Indiana Bat Habitat Survey Along 31 Miles of MFLBC</i>	10
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F I G U R E S

Figure 1: <i>Survey Points, Reach Segregations, areas of Potentially Suitable Indiana Bat Habitat, and Ohio Epa Benthic Macroinvertebrate Survey Results</i>	25
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I. INTRODUCTION

In 1992, Ruetgers-Nease Corporation submitted to USEPA Region 5 and Ohio EPA a draft Endangerment Assessment Report for the Nease Chemical Company Salem Ohio Site (the site). In response, the Biological Technical Assistance Group produced a series of comments regarding the ecological risk assessment. Among these comments was a suggestion that the Middle Fork of Little Beaver Creek (MFLBC), located in Salem and Mahoning Counties, was within the general geographic range of the federally endangered Indiana bat (*Myotis sodalis*). The comments briefly described the summer habitat requirements of the bat and suggested that the species be addressed in the revised ecological risk assessment. The revised assessment, submitted in July 1993, recommended that MFLBC be surveyed for habitat that could be potentially suitable to the bat. There are no available data to confirm or discount the current or historical use of MFLBC by the Indiana bat and this survey is not designed to provide that information. The survey is intended to confirm or discount the presence of potentially suitable habitat and thereby provide a basis for deciding whether or not the Indiana bat should be considered in the ecological risk assessment.

In October 1993, Ruetgers-Nease Corporation, USEPA Region 5, and Ohio EPA agreed upon a work plan for evaluating MFLBC's suitability as habitat for the Indiana bat. This report presents the results of the field investigation. Interpretation of the results within the context of the ecological risk assessment will be presented subsequently.

A. Status, Biology and Life History of the Indiana Bat

The Indiana bat was placed on the Federal Endangered Species List on March 11, 1967 (32 FR 4001, March 11, 1967). In 1983 The United States Fish and Wildlife Service released the *Recovery Plan for the Indiana Bat* (USFWS 1983) which describes the suspected causes for the species' decline as well as the biology and life history of the organism. Among the suspected causes listed for the decline of the species in the recovery plan are:

1. Natural causes such as flooding and cave-ins of hibernacula;
2. Disturbance and vandalism of hibernating bats;
3. Deforestation and stream channelization;

4. Pesticide poisoning; and
5. Other human activities such as biological studies, commercialization of hibernacula, exclusion of bats or modification of microclimate by the construction of poorly designed hibernacula entrance gates, and flooding by reservoir construction.

The Indiana bat is a medium-sized member of the chiropteran genus *Myotis* with a forearm length of 35 to 41 mm. The head and body length ranges from 41 to 49 mm. The species closely resembles the little brown bat (*Myotis lucifugus*), but differs in having a keeled calcar (a spur-like projection on the ankle of chiropterans). Other differences include: (1) the hind feet of the Indiana bat tend to be smaller and more delicate; (2) hairs on the hind feet of the Indiana bat tend to be shorter, (4) the Indiana bat has a small sagittal crest; and (5) the braincase is smaller, narrower, and lower in the Indiana bat.

Most Indiana bats migrate seasonally between winter and summer roosts. The U.S. Fish and Wildlife Service reports that seasonal migrations have been recorded between hibernacula in central Kentucky and summer areas in Indiana, Kentucky, Ohio, and Michigan as well as hibernacula in southern Missouri and summer areas in northern Missouri and southern Iowa. Reported migration distances between hibernacula and summer foraging habitats have been as high as 200 miles (Barber and Davis 1969). Figure 1 in USFWS (1983) presents the known and suspected range and locations of important hibernation sites of the Indiana bat. Mahoning and Columbiana Counties, which includes the Nease Chemical Superfund Site and MFLBC, fall within the described range of the Indiana bat.

Prior to hibernation, Indiana bats swarm at the hibernaculum sites. Swarming involves the gathering of large numbers of individuals that fly in and out of the hibernacula entrances but do not roost overnight. Fat reserves critical to over-winter survival are replenished prior to hibernation. It is believed that mating predominantly occurs during swarming but may occur at a limited rate throughout the winter and as bats leave hibernation.

Hibernation extends from October through April. Local weather conditions may affect the initiation and termination dates of the hibernation period.

It is presumed that females store sperm through the winter and become pregnant after emergence from hibernation. Females emerge in late March or early April with males emerging later.

Females give birth to a single offspring in June or July. During this period, females congregate in nursery colonies. Males during this period are dispersed throughout the summer range, however the roosting habits of male Indiana bats are not documented. The young are capable of flight within a month of birth.

Indiana bats feed primarily on Lepidoptera (moths and butterflies) and aquatic insects (Belwood 1979). Aquatic insects such as nematocerans (crane flies, midges, and mosquitos), trichopterans (caddisflies), ephemeropterans (mayflies), and neuropterans (fishflies, dobsonflies, etc.) have been observed to account for as much as 54 percent of the diet of pregnant female bats. After parturition and during lactation, lepidopterans predominate in the diet, accounting for as much as 70 percent of the diet. Foraging ranges from nursery roosts have been reported as 0.8 km by Humphrey et al. (1977) and 1.2 km by Cope et al. (1978).

B. Habitat Requirements

1. Winter Habitat

Indiana bats require specific roost sites in caves or mines that have stable temperatures below 10°C, with a preferred range of 4 to 8°C. Stable low temperatures are critical to the maintenance of low bat metabolic rates and the conservation of fat reserves until emergence from hibernation. Relative humidity of hibernacula has been reported to range from 54 percent to greater than 74 percent.

The temperature requirement severely limits the availability of suitable hibernacula. The structural configurations of individual caves determine the temperature and humidity characteristics required by this species. Figure 1 in USFWS (1983) shows the locations of hibernacula with a recorded population of Indiana bats greater than 30,000 since 1960. [Columbiana and Mahoning Counties are not sites of winter habitat.]

2. Summer Habitat

a) Foraging Habitat

The available data indicate that typical summer foraging habitat of the Indiana bat consists primarily of riparian and floodplain forest areas of small streams in which the canopy extends partially to fully over the stream.

Humphrey et al. (1977) studied the summer habitat and ecology of Indiana bats from a nursery colony in eastern Indiana. Foraging habitat for

this colony was confined to air space from 2 to 30 m high near the foliage of riparian and floodplain trees. During early summer, foraging was restricted to riparian habitat. Later in the season feeding extended to solitary trees and forest edge on the flood plain. Local habitats not used by members of the studied colony included upland forests, open pasture, corn fields, upland hedgerows, and creeks from which riparian trees had been removed.

Gardner and Gardner (1980) studied the relationship of Indiana bat trapping frequency to riparian vegetation and stream morphology for McGee Creek in Pike County Illinois. Indiana bats were most frequently observed in areas of the creek that exhibited mature (greater than 16 inches diameter at breast height (dbh)) riparian trees overhanging the creek bank more than 3 m on one or both sides. Closed canopy over the stream was not a factor for Indiana bat observation. Width of the riparian vegetation zone did not appear to be a factor determining Indiana bat foraging. Similarly, bats were observed over reaches where the creek widths were 9 to 11 m. Creek bottom substrate type and the presence of riffles or pools were not determinant factors.

Dominant trees about which the Humphrey et al. (1977) bats were observed feeding included sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoides*), black walnut (*Jugulans niger*), black willow (*Salix nigra*), and oaks (*Quercus* sp.). Gardner and Gardner (1980) reported that silver maple (*Acer saccharium*), box elder (*Acer negundo*), cottonwood, black willow, and sycamore were the dominant tree species in areas of Indiana bat foraging.

Little data are available concerning the exact prey species utilized by the Indiana bat. However, because the Indiana bat feeds extensively upon emergent aquatic insects during the summer, foraging habitat can be expected to include waterbodies capable of supporting the larvae of such insects.

b) Nursery Roosts

Indiana bats use exfoliating bark and tree hollows as summer nursery roosts. Humphrey et al. (1977) reported nursery colony roosting both under the exfoliating bark of a dead bitternut hickory (*Carya cordiformis*)

and a living shagbark hickory (*Carya ovata*), as well as in the hollow limb of a cottonwood. However, Humphrey et al. hypothesize that the thermal requirements of developing Indiana bat young result in a preference for the higher ambient temperatures associated with dead trees rather than live specimens for nursery sites. This is supported by findings of the authors that the nursery colony optimized time spent at the dead bitternut hickory tree nursery site which exhibited greater temperatures relative to the live shagbark hickory nursery site. Observations of bark loss on the dead tree nursery site lead the authors to estimate that a typical dead tree offers suitable nursery habitat for six to eight years. Consequently it was suggested that the Indiana bat exhibits the behavioral flexibility to move nursery sites periodically, yet still maintain the same foraging area.

II. METHODS

The methods used to qualitatively evaluate the suitability of MFLBC as potential habitat for the Indiana bat was that described in the September 1993 work plan (Ruetgers-Nease 1993). There were two components of the evaluation: a field survey of riparian vegetation characteristics; and existing Ohio EPA data on benthic macroinvertebrates in MFLBC.

A. Field Survey

Between October 16-20, a team of two biologists from ENVIRON Corporation conducted the field survey. Black and Veatch provided oversight for EPA. A float trip was made along MFLBC from the closest point practical to the site downstream to approximately 0.6 miles (1 kilometer) below the spillway at the town of Lisbon, a total distance of approximately 31 miles.

The riparian vegetation along both banks of MFLBC and its tributaries (extending upstream to about 0.6 miles where conditions allowed) were characterized as follows:

- The dominant cover type (e.g., lower story forbs/grasses, mid-story shrub/scrub, upper-story forest, or wetlands) was determined along the 31-mile stretch of MFLBC and tributaries.
- Tree species were identified and dominance of trees was estimated in forested riparian areas. Species dominance was determined at approximately one-mile intervals along MFLBC and its tributaries. Estimates were made using basal area per the Bitterlich Method and a Cruz-All (Forestry Suppliers, Inc.).
- The presence, and an estimate of prevalence, of trees exceeding 16 inches diameter at breast height (dbh) within line of sight from the streamside was noted at approximately one-mile intervals along MFLBC.
- The extent to which the forest canopy overhangs the creek and tributaries was estimated at approximately one-mile intervals and estimated from a point in the stream directly below the canopy margin to the streamside.

Data from the field survey were then used to define reaches of MFLBC that are potentially suitable as foraging and/or nursery habitat for the Indiana bat. Establishment of these reaches was based on a comparison of the survey findings (i.e, observations made at one-mile intervals as well as on a continuum) with the following habitat criteria:

1. Foraging Habitat

The available published literature describes foraging habitat for adult females and juveniles of both sexes only (Humphrey et al. 1977; Belwood 1979; Gardner and Gardner 1980; USFWS 1983). There is insufficient information regarding adult males. Given this qualification, Indiana bat foraging habitat includes riparian and floodplain forests dominated by sycamore, cottonwood, black walnut, black willow, silver maple, boxelder, and oaks. Optimal vegetation characteristics for foraging habitat includes the presence of riparian zone trees greater than 16 inches dbh and a canopy that extends at least nine feet over the creek from one or both banks. Although the presence of trees greater than 16 inches dbh is a factor characterizing optimal foraging habitat, available published literature suggests that Indiana bats also forage in areas without such individual large trees. Areas of MFLBC developed for agriculture or otherwise devoid of riparian trees would not be considered suitable foraging habitat for the Indiana bat.

2. Nursery Habitat

The available published literature describes Indiana bat nursery habitat as including dead/dying trees with bark exfoliation or cavities, living trees with evident cavities, or tree species with naturally exfoliating bark (e.g., shagbark hickory) within about 0.6 miles (1 kilometer) of streamside riparian areas (Humphrey et al. 1977; USFWS 1983). Optimal nursery structures consist of areas of dead and dying trees with considerable exposure to sunlight. The availability of sunlight was taken into account in the field survey. Only trees with exposure to sunlight were recorded.

B. Ohio EPA Benthic Macroinvertebrate Data

A further refinement, involving the presence of food items, was made to the Indiana bat foraging habitat evaluation. Available data suggest that the Indiana bat's diet is composed of a large proportion of aquatic insects including nematocerans (midges and other aquatic flies), trichopterans (caddisflies), ephemeropterans (mayflies), and neuropterans (fishflies and dobsonflies). Existing Ohio EPA data on macroinvertebrate populations in MFLBC (OEPA 1985) were used to identify reaches that would be likely to support emergent aquatic insect prey.

III. RESULTS

A. Field Survey Results

Table 1 shows the survey results for 32 discrete survey points at approximately one-mile intervals along MFLBC. It should be noted that the left and right bank designations refer to direction as one faces downstream. A comparison of the data in Table 1 with the habitat requirements presented for the Indiana bat indicates that 18 of the 32 survey points had all three of the criteria for "optimal" foraging habitat (i.e., species dominance, tree diameter, and canopy overhang). These points include #3, #4, #6, #7, #13, #17, #20-#23, and #25-#32.

- Thirty-one of the 32 survey points (not Point #19) exhibited at least nine feet of canopy overhang on one or both banks.
- Twenty-seven survey points (Points #3 - #14, #16, #17, #19-#23, and #25 - #32) exhibited dominance on one or both banks by at least one of the tree species reported to provide foraging habitat for the Indiana bat.
- Twenty-three survey points (Points #2 - #4, #6, #7, #13, #15, and #17-#32) exhibited trees with diameters greater than 16 inches.

In addition, 22 of the 32 survey points (Points #1 - #6, #8-#10, #12-#18, #20-#22, #29, #30, and #32) exhibited visible substrates potentially suitable as Indiana bat nursery habitat.

While results for each of the 32 survey points provide an indication of potential habitat suitability along MFLBC, these data should be interpreted with care. The riparian areas surrounding many of these points were highly variable with respect to canopy overhang, species dominance, tree diameters, and the presence of suitable nursery substrates when viewed as a continuum. Because of this variability, observations taken at one-mile intervals do not necessarily reflect the overall habitat suitability of a particular reach of MFLBC. The actual habitat changed over distances that were at times less than 100 yards. In order to limit

TABLE 1
Field Results for Indiana Bat Habitat Survey Along 31 Miles of MFLBC

Point'	Canopy Overhang (ft)*			Dominant Tree Species ^{b,c}		Number of Observed Trees with Diameter Greater than 16 in. at Breast Height		Observed Substrate Suitable for Nursery Sites ^d	
	Left Bank	Right Bank	Complete Overhang	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
1			yes	AE	AE,GA	0	0	yes(S)	no
2			yes	BC,WA	BC,WA	1	0	no	yes(S,H)
3			yes	BE,BC	WA,BE	0	1	yes(S)	yes(S)
4			yes	SY,SM,BE	SH,RO,SU	5	0	no	yes(S,H)
5			yes (intermittent)	SY,BE,BW	SY,BE,BW	0	0	no	yes(S)
6			yes	SU	BW,SU	0	1	no	yes(L)
7			yes	SY,AB	SU,AB	>5	>5	no	no
8	20	20		GA,SY	SY	0	0	yes(S)	no
9	10	10		BL	BL,SY	0	0	no	yes(S,H)
10	15-20	15-20		AE	AE,SY	0	0	no	yes(S)
11			yes	BW,BE	WA	0	0	no	no
12			yes	AB	RM,BE	0	0	yes(S)	no
13			yes	SM,RM	AE,RM	>5	>5	yes(S)	no
14			yes	SM,RM	AE,RM	0	0	yes(S)	yes(S)
15			yes	RM,BC	RM	0	>5	no	yes(S)
16			yes	SY,BW	SU	0	0	no	yes(S)
17			yes (intermittent)	RM	BL,AE,RM	0	1	no	yes(S)

TABLE 1
Field Results for Indiana Bat Habitat Survey Along 31 Miles of MFLBC

Point ^c	Canopy Overhang (ft) ^a			Dominant Tree Species ^{b,c}		Number of Observed Trees with Diameter Greater than 16 in. at Breast Height		Observed Substrate Suitable for Nursery Sites ^d	
	Left Bank	Right Bank	Complete Overhang	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
18			yes	SU, RM	SU, AE	5	3	yes(S)	no
19	< 1, except for one isolated tree, emergent wetland and crop cover dominate this area	< 1 emergent wetland and crop cover dominate this area		BW	no trees	1	0	no	no
20	12	< 1		AE, BC	BL	1	1	yes(S)	yes(S)
21	20	20		SM	SM	6	5	yes(S)	no
22	20	30		AB, SM, RM	SU	6	5	yes(S)	yes(S)
23			yes	SM	HE, RM	8	6	no	no
24	25	25		AB, AE	SU, RM	11	12	no	no
25			yes	SM	RM, SM	6	19	no	no
26	9-23	8-20		SM, AE	HE, AB	7	> 16	no	no
27			yes	SM, SY, BC	SU	13	9	no	no
28	22	25		SY, SU	SU	12	17	no	no
29	20	20		SM, BW, HL	SM, SU, RM	10	5	yes(S)	yes(S)

TABLE 1
Field Results for Indiana Bat Habitat Survey Along 31 Miles of MFLBC

Point ^a	Canopy Overhang (ft) ^a			Dominant Tree Species ^{b,c}		Number of Observed Trees with Diameter Greater than 16 in. at Breast Height		Observed Substrate Suitable for Nursery Sites ^d	
	Left Bank	Right Bank	Complete Overhang	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
30	25, isolated stands of trees and mowed grass	20		SM,BW,HL	SM,SU,RM	0	3	yes(S)	yes(S)
31	12, isolated stands of trees and mowed grass	19		SM,BW	BW,SM,AE	1	2	no	no
32	no trees, area is industrial with no cover	20		no trees	CW,AE,RO	0	5	no	yes(S)

TABLE 1
Field Results for Indiana Bat Habitat Survey Along 31 Miles of MFLBC

Point*	Canopy Overhang (ft) ^a			Dominant Tree Species ^{b,c}		Number of Observed Trees with Diameter Greater than 16 in. at Breast Height		Observed Substrate Suitable for Nursery Sites ^d	
	Left Bank	Right Bank	Complete Overhang	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank

^a Canopy overhang was recorded for each forested bank if overhang did not extend completely across stream. Complete overhang or overhang at least nine feet from one or both banks is consistent with Indiana bat foraging habitat.
^b Dominant tree species were those with basal area 20% or more of the total overstory basal area.
^c Tree species are as follows (species with * are known from the literature to be consistent with Indiana bat foraging habitat):
 AB-American beech (*Fagus grandifolia*)
 AE-American elm (*Ulmus americana*)
 BC-black cherry (*Prunus serotina*)
 BE-boxelder (*Acer negundo*)*
 BL-black walnut (*Juglans nigra*)*
 BW-black willow (*Salix nigra*)*
 CW-cottonwood (*Populus deltoides*)*
 GA-green ash (*Fraxinus pennsylvanica*)
 HE-hemlock (*Tsuga canadensis*)
 HL-honeylocust (*Gleditsia triacanthos*)
 RM-red maple (*Acer rubrum*)
 RO-red oak (*Quercus rubra*)*
 SH-shagbark hickory (*Hicoria ouata*)
 SM-silver maple (*Acer saccharinum*)*
 SU-sugar maple (*Acer saccharum*)
 SY-sycamore (*Platanus occidentalis*)*
 WA-white ash (*Fraxinus americana*)
^d Letters in parentheses indicate the following:
 S-Standing dead with cavities of exfoliating bark observed.
 L-Living tree with cavities or dead branches with exfoliating bark.
 H-Shagbark hickory trees observed.
 * Observation points are at approximate one-mile intervals

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this sampling bias, notes were made in the field between each formal survey point (see Attachment N1-A). These notes provide additional information on potential nursery substrates as well as spacial trends in canopy overhang and tree species. By combining the point survey data and supplemental information, the MFLBC can be segregated into reaches designated as potentially suitable or unsuitable for Indiana bat foraging/nursery habitat. These reach segregations are described below and presented on Figure 1.

The suitability of an area for Indiana bat habitat is based on comparison to evaluation criteria for both foraging and nursery habitat. This information was in many cases supplemented with field notes on the suitability of areas between survey points (see Attachment N1-A for field notes). Optimal habitat is habitat that meets all four of the evaluation criteria in Table 1 for both foraging and nursery habitat. These criteria are:

1. Canopy overhang of 10 feet or greater beyond the streambank;
2. Presence of riparian and flood plain forests dominated by sycamore, cottonwood, black walnut, black willow, silver maple, boxelder, and oaks;
3. Presence of riparian zone trees greater than 16 inches dbh; and
4. Presence of standing dead/dying trees with bark exfoliation or cavities, living trees with evident cavities, or tree species with naturally-exfoliating bark (e.g., shagbark hickory) within 1 km of riparian areas with adequate exposure to sunlight (nursery habitat).

Optimal habitat is habitat which meets all four of the evaluation criteria for both foraging and nursery habitat. Potentially suitable habitat met two or more of the criteria for foraging and nursery habitat. A suitable habitat met none or one of the criteria for foraging and nursery habitat. Judgement on the suitability of stretches was supplemented by field notes.

Reach 1: MFLBC between the Crane Deming Facility and 1,800 feet below Middletown Road

Reach 1 extends from a point on MFLBC immediate to the Crane Deming Facility downstream to approximately 1,800 feet below Middletown Road and includes survey

Points #1-#8. Overall, this reach can be characterized as exhibiting tree species, tree sizes, canopy overhang, and nursery substrates potentially suitable for the Indiana bat.

All survey points and almost all the area in between exhibited canopy overhang that was complete or greater than nine feet from one or both banks. Although the survey at Point #5 shows complete canopy overhang, it should be noted that the overhang is intermittent for a distance of approximately 600 feet upstream and 200 feet downstream of this point. In this area, the creek exhibits 50-yard-long areas of complete overhang interspersed with equivalent stretches of shrub/scrub with overhangs of less than six feet. The short lengths of open shrub/scrub riparian areas immediate to Point #5 were not judged to be of sufficient size to present a barrier to foraging by a species such as the Indiana bat.

Although survey Points #1 and #2 show no tree species associated with Indiana bat habitat, stands of red oak, maples, and black willows and individual shagbark hickories (species associated with the bat) were noted in the riparian zone of the creek between Points #1 and #2 and #2 and #3. Survey points #1 and #2 were not considered suitable habitat for the Indiana bat. Points #3-#8 exhibited tree species that can potentially provide habitat for Indiana bats.

Trees with diameters greater than 16 inches were observed at all survey points in this reach, except Points #1, #5, and #8. However, trees of this size were noted within 300 feet of Points #1 and #5 and 500 feet of Point #8.

Substrates potentially suitable for Indiana bat nursery sites were observed at all survey points in this reach except Point #7.

Reach 2: MFLBC between 1,800 and 6,400 feet below Middletown Road

Reach 2 extends for a 4,600-foot distance downstream from approximately 1,800 feet below Middletown Road and includes only survey Point #9. This area is judged to be only potentially foraging habitat for the Indiana bat due to a lack of consistent canopy overhang. Only isolated riparian trees extend over the stream (at Point #9 this overhang is 10 feet from both banks). Potentially suitable nursery structures were noted in Reach 2.

Reach 3: MFLBC between 6,400 feet below Middletown Road and the old Conrail railroad bridge

Reach 3 extends from 6,400 feet below Middletown Road to the old Conrail railroad bridge just north of the town of Franklin Square and includes survey Points #10-#18. Overall, this reach can be characterized as exhibiting tree species, tree sizes, canopy overhang, and nursery substrates potentially suitable for the Indiana bat.

All survey points and almost all areas in between exhibited either complete canopy overhang or canopy overhang extending beyond nine feet from one or both banks. An exception to this characterization lies in the vicinity of the Butcher Road Bridge, where approximately 600 feet of the stream are bounded by shrub/scrub with isolated trees. This area exhibits limited canopy overhanging the stream channel.

The exception to this was a change in dominant vegetative cover of the area midway between survey points #15 and #16 through the 90-degree bend between survey points #16 and #17. This area was dominated by Japanese Knotweed (*Polygonum cuspidatum*), an exotic invasive herbaceous species which grows up to 10 feet high. The knotweed dominated most of the area between the points described above, except for a small wooded area near survey point #16. Since most of this area is dominated by Knotweed to the exclusion of most large riparian tree species, this area probably does not represent potentially suitable habitat for the Indiana Bat.

All survey points except #15 and #18 exhibited dominant tree species that are reported in the literature to provide habitat for Indiana bats. At survey Points #15 and #18, red maples and sugar maples, but not silver maples, were dominant tree species.

While trees greater than 16 inches in diameter were not observed at survey Points #10, #11, #12, #14 and #16, many large trees were observed between Points #13 and #14 and between #16 and #17. The lack of large diameter trees in the area defined by Points #10-#12 suggests something less than "optimal" foraging habitat.

Substrates potentially suitable for nursery sites were observed at all survey points except #11. However, many standing dead trees were noted between Points #11 and #12.

Reach 4: MFLBC between the old Conrail railroad bridge and 1,300 feet below Highway 558

Reach 4 extends from the old Conrail railroad bridge to approximately 1,300 feet below Highway 558 and includes survey Point #19. This area is almost devoid of any riparian trees with the surrounding land in agriculture or emergent wetlands. The lack of large trees and an overstory canopy precludes this area from being considered either foraging or nursery habitat for the Indiana bat.

Reach 5: MFLBC 1,300 feet below Highway 558 to the Lisbon Spillway

Reach 5 extends from a point approximately 1,300 feet below Highway 558 to the spillway at the town of Lisbon and includes survey Points #20-#27. This reach can be characterized as exhibiting tree species, tree sizes, canopy overhang, and nursery substrates potentially suitable for the Indiana bat.

All survey points and areas between the survey points exhibited significant canopy overhang. Trees greater than 16 inches in diameter were observed at all survey points. With the exception of survey Point #24, all points exhibited dominant tree species reported in the literature to provide habitat for Indiana bats. As in Reach 3, the morphological similarity of sugar and red maples (which were observed at Point #24) to silver maples was considered sufficient to include these species in the list of potential forage habitat trees for the Indiana bat. In addition, silver maples were observed at Point #24 and the areas surrounding the survey point, but were not numerous enough to be designated as dominant species.

Substrates potentially suitable for nursery sites were observed at survey Points #20-#22 but not at Points #23-#27. However, standing dead trees or living trees with large cavities were observed between Points #22-#23, #24-#25, #25-#26, and #26-#27.

Reach 6: MFLBC from Lisbon Spillway to 800 feet below the Route 30 Bridge

Reach 6 extends from the spillway at Lisbon to 800 feet below the Route 30 Bridge and includes survey Points #28 and #29. This reach exhibited potentially suitable habitat for the Indiana bat in terms of canopy cover, tree species and size, and (in the case of Point #29) the presence of substrate for nursery sites. The canopy overhang for Points #28 and #29 extends greater than nine feet over the stream. Dominant tree species are those known from

other areas to provide habitat for Indiana bats. Structures potentially suitable for nursery sites were observed at Point #29 but not at Point #28.

Reach 7: MFLBC from 800 feet below Route 30 to Market Street

Reach 7 encompasses Points #30-#32 in the area adjacent to the town of Lisbon. Beyond 800 feet below the Route 30 Bridge, the reach should be considered marginal foraging habitat in the area extending to a point approximately 500 feet upstream from the bridge at Market Street. The characterization of this area as marginal habitat is based upon the observations that there is little forest cover along the highly developed Lisbon side of MFLBC from a point just downstream from the Route 30 Bridge down to Market Street, and the canopy overhang measurements for the left bank survey Points #30 and #31 are for isolated stands of trees not continuous cover. Point #32 is unvegetated on the Lisbon bank and is a steep forested cliff opposite the town. The majority of canopy cover is associated with the bank opposite of Lisbon (the right bank). The canopy overhang on the right bank is also not continuous. An approximate 500-foot interval just downstream from Route 164 is the site of industrial activity and is devoid of trees. The forested portions of the right bank below Route 30 exhibit a potentially suitable foraging habitat and some potentially suitable substrates for nursery sites.

Tributaries to MFLBC

Tributaries to MFLBC were investigated for potential bat foraging habitat at a point about 0.6 miles upstream of its confluence or to an upstream point deemed practical for navigation by the field investigators. A total of 11 tributaries were surveyed for canopy overhang and dominant tree species. In addition, observations of the tributary flow were noted. Of the 11 tributaries, #2, #5, #6, #8, and #10 are judged unlikely to provide foraging habitat for Indiana bats. Tributary #5 is less than 100 feet in length and is therefore not likely to be used by bats in preference to the main channel of MFLBC in that area. Tributary #6 drains a shrub/scrub area, not woodlands, therefore not offering the potentially suitable forest canopy overhang. Similarly, Tributary #8 drains an emergent wetland devoid of trees. Tributaries #2 and #10 are dominated by red and sugar maples but not silver maples. The detailed results of the tributaries survey are as follows:

- Tributary #1** A tributary enters MFLBC on the right bank immediately downstream from survey Point #7. The flow of water from this tributary was judged to be extremely small with only intermittent pools of surface water visible in the channel. The area drained by this tributary exhibited complete canopy overhang, with an overstory dominated by boxelders and red maples.
- Tributary #2** A tributary with noticeable flow enters the left side of MFLBC approximately 0.3 mile downstream of survey Point #8. The surrounding land immediate to its confluence with MFLBC was sparsely treed; however, approximately 500 yards upstream the tributary has complete canopy cover. Red and sugar maple are the dominant overstory.
- Tributary #3** A tributary enters the left side of MFLBC at survey Point #12. This tributary was several feet wide and in a heavily forested area. Canopy cover was complete and dominated by silver maples.
- Tributary #4** A tributary enters the left side of MFLBC at survey Point #14. This tributary exhibited significant flow and drained an area of complete canopy overhang dominated by silver and red maples.
- Tributary #5** A short tributary enters the left side of MFLBC roughly 0.5 mile below survey Point #16. This tributary is less than 100 feet in length and drains an emergent wetland area. The lack of tree cover suggests that this tributary would not be suitable Indiana bat habitat.
- Tributary #6** A tributary enters the left side of MFLBC 0.5 mile below survey Point #18. This tributary drained an area of shrub/scrub with no forest cover. The lack of tree cover suggests that this tributary would not be suitable Indiana bat habitat.
- Tributary #7** A tributary enters the right side of MFLBC immediately downstream of Tributary #6. This tributary has complete canopy overhang dominated by

red and silver maples. Numerous standing dead trees were also noted along this tributary.

Tributary #8 A large tributary enters the left side of MFLBC immediately downstream of Point #19. The tributary flows under Lisbon-Canfield Road and drains an emergent wetland with no trees. The lack of tree cover suggests that this tributary would not be suitable Indiana bat habitat.

Tributary #9 A tributary enters the right side of MFLBC just downstream of survey Point #22. This tributary was approximate 1.5 feet wide, less than 1 foot deep, and has complete canopy overhang dominated by black walnut and silver maple.

Tributary #10 A small tributary enters the right side of MFLBC just upstream of the covered bridge at Eagleton Road. This tributary was less than 1.5 feet across and only a few inches deep. The tributary drained an area of complete canopy overhang dominated by red and sugar maples.

Tributary #11 A large tributary enters the right side of MFLBC approximately 0.6 miles down from the covered bridge. The tributary was 8 to 10 feet wide and had complete canopy overhang dominated by sycamore, silver maple, and tulip poplar.

B. Comparison of Potentially Suitable Foraging Habitat Areas with Benthic Macroinvertebrate Data

Figure 2 presents a comparison of the MFLBC reaches and tributaries considered to be potentially suitable foraging habitat for Indiana bats with the results of Ohio EPA benthic macroinvertebrate surveys in MFLBC. The Ohio EPA survey found at least two of the four orders of aquatic insects that are reported in the literature to be components of the Indiana bat diet to be present in the reaches designated as having potentially suitable bat habitat. These results suggest that the MFLBC in areas of suitable foraging habitat could potentially provide a base of emergent insect prey for bats.

IV. LIMITATIONS OF THE STUDY

A. Physical Limitations of Field Observation Methods

By design, the study used the MFLBC stream channel as the point from which observations were made. Tree stand densities and topography limited the distance over which accurate line-of-site observations of nursery structures and trees greater than 16 inches dbh could be made. This was particularly apparent in Reach 5 where steeply sloped banks and dense stands of sugar maples severely limited the effective range of visual observations.

B. Application Limitations of the Survey

This survey was based on habitat parameters, selected from the publicly available literature, observed in areas used by Indiana bats in other geographic locations. Although Salem and Mahoning Counties are in the general geographic range of the Indiana bat, no data are available to confirm the bat's current or historical use of the MFLBC watershed. In the absence of use data, there is a level of uncertainty in extrapolating the habitat parameters from the study areas reported in the literature to the MFLBC study area. As a consequence, this survey can only be used to identify potentially suitable habitats for Indiana bats. It cannot be used to determine the probability that Indiana bats actually use or have used the potentially suitable habitats identified for MFLBC.

V. CONCLUSIONS

While there are no available data to confirm or discount the use of MFLBC by the Indiana bat, the habitat suitability evaluation confirmed the presence of potentially suitable habitat in the study area. On this basis, and because MFLBC is within its general geographic range, the Indiana bat can be considered a potential receptor for the MFLBC ecological risk assessment.

Much of the 31-mile stretch of MFLBC that was surveyed did exhibit characteristics consistent with the foraging and nursery habitat reported in the literature for the Indiana bat. Exceptions included an area upstream of State Route 45 (Reach 2) and the Franklin Square area (Reach 4) where stream canopy cover was lacking, and below State Route 30 near the town of Lisbon (Reach 7) where the area is industrialized. In addition, six of the eleven MFLBC tributaries that were surveyed exhibited suitable characteristics to consider them as potential Indiana bat habitat. The Ohio EPA benthic macroinvertebrate data suggest that MFLBC could potentially provide a base of emergent insect prey if, in fact, the Indiana bat was to inhabit this area

The survey results are qualitative, Figure 1 depicts areas along MFLBC that could be considered either potentially suitable or unsuitable habitat. Quantification of the areal extent of potential habitat was not the objective of the survey, nor can the results be used to infer such (i.e., the hatched areas on the map represent distance along the length of MFLBC but not the distance perpendicular to the stream channel). Interpretation of the results within the context of the ecological risk assessment will be presented subsequently.

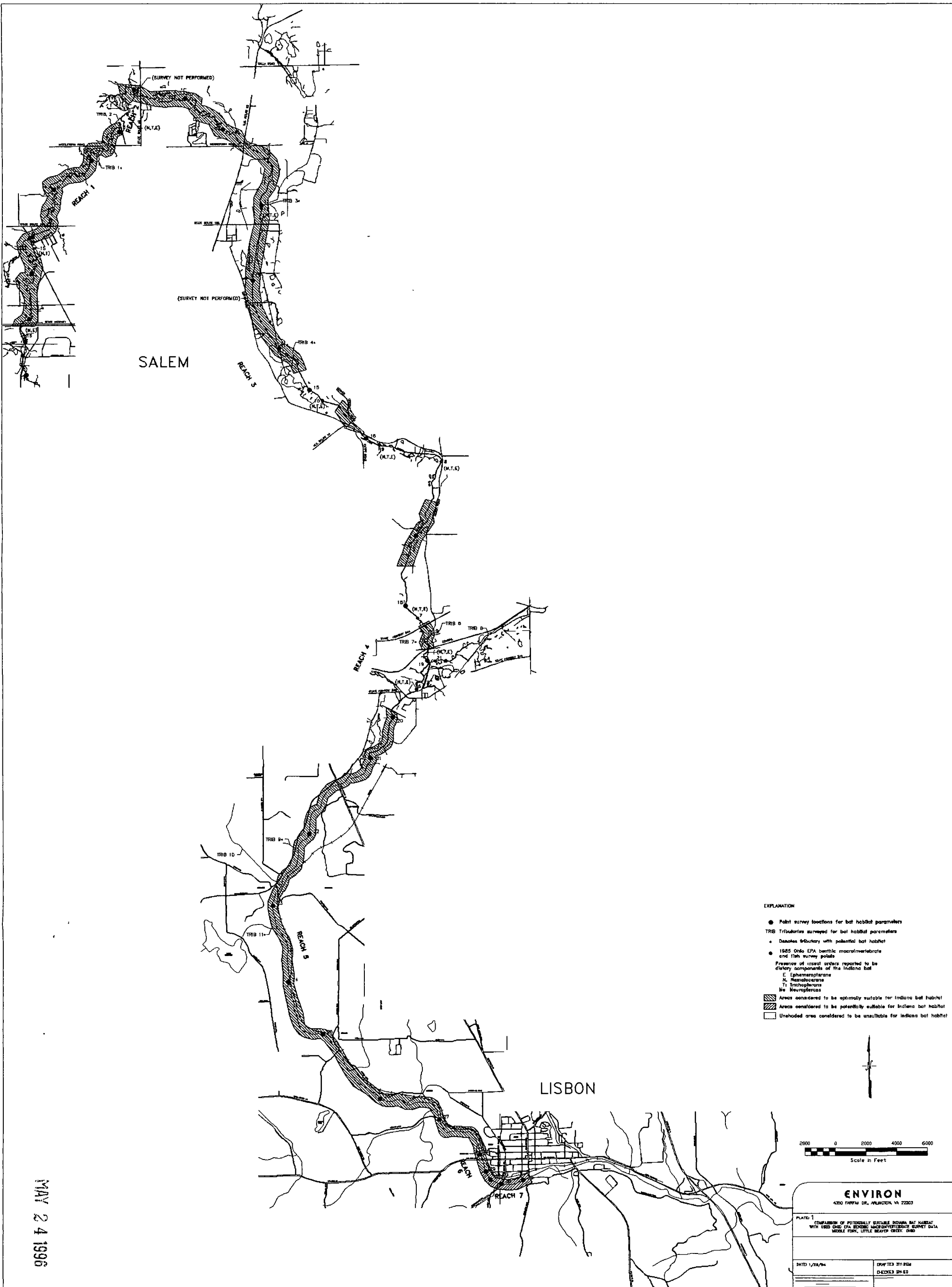
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FIGURE 1

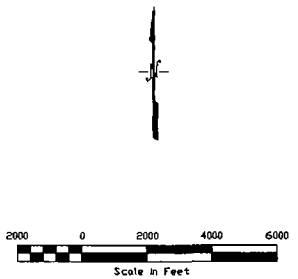
**SURVEY POINTS, REACH SEGREGATIONS,
AREAS OF POTENTIALLY SUITABLE INDIANA BAT HABITAT,
AND OHIO EPA BENTHIC MACROINVERTEBRATE SURVEY RESULTS**



SALEM

LISBON

- EXPLANATION
- Point survey locations for bat habitat parameters
 - TRB Tributaries surveyed for bat habitat parameters
 - Reaches tributary with potential bat habitat
 - 1985 Ohio EPA benthic macroinvertebrate and fish survey points
 - Presence of insect orders reported to be dietary components of the Indiana bat
 - E: Ephemeroptera
 - N: Neuroptera
 - T: Trichoptera
 - M: Megoptera
 - ▨ Areas considered to be potentially suitable for Indiana bat habitat
 - ▨ Areas considered to be potentially suitable for Indiana bat habitat
 - Unshaded area considered to be unsuitable for Indiana bat habitat



ENVIRON 4350 FARFAM DR., ARLINGTON, VA 22203	
PLATE 1 COMPARISON OF POTENTIALLY SUITABLE INDIANA BAT HABITAT WITH 1985 OHIO EPA BENTHIC MACROINVERTEBRATE SURVEY DATA MOBILE FORD, LITTLE BEAVER CREEK, OHIO	
DATE: 1/28/94	DRAWN BY: BGM CHECKED BY: BGM

MAY 24 1996

ATTACHMENT N1 - A

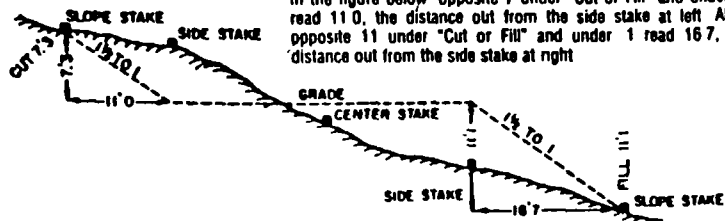
FIELD NOTES

ENVIRON

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below opposite 7 under "Cut or Fill" and under 3 read 11 0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under 1 read 16 7, the distance out from the side stake at right.



Cut or Fill	Distance out from Side or Shoulder Stake										Cut or Fill
	0	1	2	3	4	5	6	7	8	9	
0	00	02	03	05	06	08	09	11	12	14	0
1	15	17	18	20	21	23	24	26	27	29	1
2	30	32	33	35	36	38	39	41	42	44	2
3	45	47	48	50	51	53	54	56	57	59	3
4	60	62	63	65	66	68	69	71	72	74	4
5	75	77	78	80	81	83	84	86	87	89	5
6	90	92	93	95	96	98	99	101	102	104	6
7	105	107	108	110	111	113	114	116	117	119	7
8	120	122	123	125	126	128	129	131	132	134	8
9	135	137	138	140	141	143	144	146	147	149	9
10	150	152	153	155	156	158	159	161	162	164	10
11	165	167	168	170	171	173	174	176	177	179	11
12	180	182	183	185	186	188	189	191	192	194	12
13	195	197	198	200	201	203	204	206	207	209	13
14	210	212	213	215	216	218	219	221	222	224	14
15	225	227	228	230	231	233	234	236	237	239	15
16	240	242	243	245	246	248	249	251	252	254	16
17	255	257	258	260	261	263	264	266	267	269	17
18	270	272	273	275	276	278	279	281	282	284	18
19	285	287	288	290	291	293	294	296	297	299	19
20	300	302	303	305	306	308	309	311	312	314	20
21	315	317	318	320	321	323	324	326	327	329	21
22	330	332	333	335	336	338	339	341	342	344	22
23	345	347	348	350	351	353	354	356	357	359	23
24	360	362	363	365	366	368	369	371	372	374	24
25	375	377	378	380	381	383	384	386	387	389	25
26	390	392	393	395	396	398	399	401	402	404	26
27	405	407	408	410	411	413	414	416	417	419	27
28	420	422	423	425	426	428	429	431	432	434	28
29	435	437	438	440	441	443	444	446	447	449	29
30	450	452	453	455	456	458	459	461	462	464	30
31	465	467	468	470	471	473	474	476	477	479	31
32	480	482	483	485	486	488	489	491	492	494	32
33	495	497	498	500	501	503	504	506	507	509	33
34	510	512	513	515	516	518	519	521	522	524	34
35	525	527	528	530	531	533	534	536	537	539	35
36	540	542	543	545	546	548	549	551	552	554	36
37	555	557	558	560	561	563	564	566	567	569	37
38	570	572	573	575	576	578	579	581	582	584	38
39	585	587	588	590	591	593	594	596	597	599	39
40	600	602	603	605	606	608	609	611	612	614	40

"Rite in the Rain"
ALL-WEATHER WRITING PAPER



Ed OdenKirchen and

Name Tom Angus

Address ENVIRON Corp

4350 North Fairfax Dr Arlington VA

Phone 703 - 516 - 2300

Project RN: Salem

Field Notes

"Rite in the Rain"—a unique all-weather writing surface created to shed water and to enhance the written image. Makes it possible to write sharp, legible field data in any kind of weather.

a product of

J. L. DARLING CORPORATION
TACOMA, WA 98421-3696 USA

CONTENTS

[illegible]

10/17/93	7:00	Arrived at
RN site	No	B&V or Ed Kane
	7:15	Arrived at Allen Road
	No	B&V or Ed Kane
	7:30	Returned to RN Site
	Met	w/ B&V people

7:45	@ Allen Road	Observed	Great blue-
			woodchuck

Point ① on creek along
After Road opposite Crane
Downing, Ash Downland
Complete canopy closure for
This point down
For Den Red Tailed Hawk
kingfisher-

	1 den	Tree	Engelmann	P	
West:	American Elm	Bass	Downy	75%	q.
	Green Ash			5%	f/a
	sited	Chipmunk			
East	Other side	Ash	dominates	80%	f/a
		Elm	Bass	20%	f/a

Closure is total

4

Fox den between Allan Road
and Point. white tail deer trails
old beaver sign
dead trees, standing deadwood.
complete overhang. from point 1
to Allan Rd

West of Allan road, stands of
large beech and oak.

one shagbark Hickory 200 yards
west of Allan Rd

drove along creek west to
state highway, cover continuous,
large beech + oak continue to dominate.

Intersection of creek with
rt 62, many dead trees.
raccoon sign under bridge
Fox tracks
minnow

cruse all

5

Point 2

West: very little tree cover on west
side of bank. Corn field
thin strip of trees, white wh, black cherry

East: white ash = 70 ft/ac
black cherry 20 ft/ac

Deer tracks

standing deadwood.

ash dominant.

overhang - completely encloses.

dead trees, one shagbark hickory

one black willow between point 2
and road, 16 inch DBH

otter or muskrat tracks +
den between point 2 and road
cover ends 50 yards south of
road.

North side of highway numerous
dead elms, forest canopy
begins 80 yards of road.

6

10 AM Left Joe's C. From
Black + Neatch to pick up
rental car.

Point 3

complete canopy over land
facing downstream:

L = left side

R = right side

Left:

Basal area

Box Elder = 45 Ft / acre

black cherry = 15

~~black willow~~

some standing deadwood.

Right:

black willow > 16 DBH

~~without~~

standing deadwood 5 trees, exfol bark

white ~~stark~~ ash = 15 Ft / acre

Box elder = 18 Ft / acre

white tail deer

3A 50-60 paces w/o

canopy overhang

then shift

into maples (sugar) on left
ash + scrub on ~~left~~ right

3B

large Black willow - dead
possible otter run.

3B canopy opens up for
100 yards

(at bend approx ~~200~~

0.5 mile before pine lake m.

then black cherry, elm, ~~black~~

~~willow~~ ~~ash~~ ~~scrub~~

silver maple, ~~various~~

silver maple, red maple

maxie on left.

right, black willow > 16, scrub.

suitable with intermittent

canopy to 25 yards of road

white tail deer

black head chickadee

palm weavers, fox burrows,
crows

4 Fast Pine Lake Road

Frog, racoon tracks
~~set~~ continuous canopy
black willow
mixed trees

Mink Feels (good ID ED!)
aspen, fish

transition to more maples
red, sugar 200 yards down

0.1 mile from Pine Lake rd,
lots of box elder.
break in canopy for 25 yards.
power lines cross creek.

2 Black willow dbh > 10
standing deadwood cardinal.

Cottonwoods, mixed
lots of maple, box elder, as
ash

elm dbh > 10
beaver or muskrat

0.3 mile from Pine Lake rd, little 7
red oak bend after going straight
standing deadwood.
canopy still complete
elm.

beech DBH > 10

other scat
many large trees DBH > 10

beaver sign, pilated woodpecker
standing deadwood.

~ 0.25 mile upstream of
point 4. Deer tracks
black duck

50 yards, another black duck
Point 4

overstory complete

Left: — several sycamore dbh > 10
sycamore basal = 60 ft/acre
Silver maple = 35 ft/acre
red maple = 5 ft/acre
box elder 25

right:

red maple:

3 red oak

sugar maple

steepness of bank precludes
bitterlick

3 shagbark hickory

huge dead standing dbh > 16
exfoliated bark.

break in canopy 50 ft.
then 50 ft canopy, then
50 ft open

intermittent canopy next
200 yards

maple, beech

numerous trees > 16 inch DBH
canopy stops ~~at~~ 300 yards
from station 4

suddenly becomes shrub/scrub.

Great Blue Heron -

For 810 feet below
canopy, break shrub, scrub,
isolated sycamores on
left bank at 810 feet
and small black cherry
but still remains open

Point 5

0.1 mile from downstream
of Goshen road.

intermittent canopy
box elders, sycamores
one large locust?

not enough trees for basal
canopy has complete
coverage in spots

200 feet down becomes
closed canopy
box elder, sycamore, black willow
no standing deadwood in sight

wastewater effluent pipe emptying
organic material from
trailer park into creek.

And pipe emptying
50 ft further down.

Large dead tree past
wastewater effluent pipe
lots of organic material
in water

route 165 crosses creek
canopy remains complete
50 yards from rt 165
canopy opens for 50 feet,
then closes
lots of maple

black willow dbh > 16
50 yds down canopy opens
for 50 ft
1/4 mile from rt 165
8 red maple with large cavity dbh > 16
canopy becomes more open

Point 5B Foot Bridge
maples become more
dominant, sycamores, willows

canopy opens up ~~at~~ for
200 yards closes back in
after 50 yds. From intermittent
to full canopy, maples
more dominant.

deer & racoon tracks
great blue heron

Point 6 on next page

Point 7

tree types similar +
canopy between 6 + 7
complete overhang

left: sycamore = 45 ft/ac
beech = 35 ft/ac

sugar maple = 5
bitternut hickory = 10
many trees dbh > 16 inches
on both right & left

right: beech = 45
sugar maple = 35

→ more to next page

Point 6

L: ^{sugar} maple = 90 #/ac
 white ash = 15 #/ac

R: beech = 10
 black willow = 40
 sugar ~~maple~~ maple = 30
 elm = 15

overhang complete
 not any standing deadwood

black willow seven cavities,
 one hollow branch dbh > 16

1/2 mile from point 6
 (cover remains same)
 several standing deadwood

Tributary coming in
 right at point 7
 Goes through same cover type

10/17/13

Other side of middleton rd
 cover remains same in creek
 at 8:00 AM left hotel 6:15 P

7B tributary remains almost
 completely dry, even in
 rain storm.

box elders, maples, still
 complete canopy overhang

Point 8

Left: Ash = 35 #/ac
 Black cherry = 5
 Sycamore = 20
 one bitternut hickory
 many dead trees standing,
 exfoliating bark, complete canopy
 canopy ~ 20 ft

right:

Sycamore = 50 ft / ac
 black willow = 10
 red maple = 5
 no dead trees visible on right
 small flat on right with no
 canopy for 50 ft, then
 canopy complete again.

200 yards down in right
 200 ft before bridge
 big pile of railroad ties.

canopy opens up at
 foot for 200 ft, then
 line of trees, agricultural
 land behind it. then closes
 back up again with good canopy
 cover after 200 ft.

0.2 mile past first bridge,
 agricultural land, intermittent
 trees spaced out 15-25

yards from each other,
 a few standing deadwood,
 exfoliating bark
 (Top of Map 4) -
 lots of excavation on left
 bank.

SB bridge cover remains
 open, into nutrient
 trees, agric. land,
~~and~~ drainage pipe on right,
 just before bridge, no effluent
 shrub / scrub after bridge

next bridge 0.1 mile from
 other bridge, trib
 coming in on right has
 water in it ~~not~~ not well
 treed. 1 km up it became
 forested. only sheen on
 water. sulfur smell (silty
 muck bottom).

8C begins to close in again

Left
black walnut = 90
red maple = 10
sycamore = 5

No dead trees, no trees dbh > 16

Right:
1 dead shagbark hickory,
cavity

numerous trees w/ dbh > 16

box elder = 10 5 ft lac

black willow = 5 5 ft lac

black walnut = 45 5 ft lac

sycamore = 18

over hang 10 ft, then
becomes more complete.

0.1 mile past 8C
some kind of farm machinery
road goes through creek,
no bridge significant

runoff + erosion

Point 9

Same as 8C

no standing dead trees visible.
maples become more
predominant. Lots of sycamore
lots of trees w/ DBH > 16

Downstream of Point 9

0.1 mile (less overhang
large fish (cav?))

Houses, less forested.

small patches of oily sheen
on water,

Small 9 inch drainage pipe
on right just before road

~~and~~ bridge

0.6 mile down
a few shagbark Hickory
more open near power lines

Point 11

L: Black willow = 10
Box elder = 10
~~10~~

R:
Bitternut Hickory =
white ash =
narrow line of trees,
can't do bird area.

intermittent breaks in
overhanging deadwood with
either side.
overhanging intermittent is complete
~~Big island on left~~

Big Island on left
just after point 11

~~200 yards long~~
~~the camp~~

200 yards
right bank begins to
overhang more
a few cottonwoods
100 ft next bend:
more overhanging, big black
willows, trees denser
on bank
lots of ~~maple~~ sugar +
silver maples
large carp.

12:02 AM reached
~~the~~ middle of rd.

good camp, overhanging
part middle of rd.

Big Island, dead tree
lots of dead trees

complete canopy over hanging
water bridge, heavily treed.

○ 1 mile on right
small tributary 1 ft wide
over hanging with ~~willow~~ black willow
then canopy thins a little,
but still over hanging
becomes much more open after
100 ft

○ 0.3 mile down over similar
beaver sign.
beaver dam soft down.
becomes intermittent
canopy

2nd beaver dam 200 ft
down.
couple of standing dead wood
100 ft down from dam
large carp, ~~2~~ mallards

Point 10 raining
unbelievably
heavily treed
Elm = 60
beech = 10
sycamore = 5
almost complete overh.
both sides (15-20 ft)
+ some completely over

R =
sycamore = 40
Elm = 50
box elder = 10
black cherry = 5

~~standing~~ a few standing
dead wood useful for
+ cavities

24

1:10 PM

~~Station~~ Point 12

L: Beech: 110
 Silver maple: 5 red oak = 5
 elm: 15

~~can~~ complete canopy overhang
 two standing deadwood small

R: Single line of
 trees abutting a corn field
 red maple, ash, box elder
 no basal area individual
 trees.

Point 12 is at tributary
 coming in on 6 ft
 about 1/2 mile from
 middleturn road.
 tributary good size, several
 feet wide, heavily treed.
 opens up just past
 point 12, for
 several big sycamores,
 lots of little black willow

Took out at 105
 1:30 PM

Point 13

canopy overhang ~~no~~ complete

L: silver maple 40
 red maple 15
 elm 5

R: Elm = 15
 red maple = 25

Green Ash = 5

numerous trees both sides
 large dead trees with a foliating
 bark on right.

left large areas of dead
 trees 200 yards beyond creek.

scouted put in/pull out
 points until 5:30 PM.

10/18 6:00 AM left to
 drop off car downstream
 6:50 AM arrived at
 Pine Lake road to put in.

For 0.25 mile past
 bridge, intermittent cover,
 Bl willow, box elder, maple
 some standing deadwood, many
 trees Ju/DBH 5/6
 tributary on right 200 ft from
 drains large stand of maple

bridge, large beaver dam
 beaver lodge, saw the beaver.
 several ducks, couldn't see
 what kind.
 Creek has become much
 deeper and wider in the
 last mile.

shrub/scrub mixed with more
 tree area.
 intermittent canopy.
 Canadian Geese

Power lines / Point 14
 300 ft below power line

many standing dead trees
 within a few hundred yards of
 right bank. mostly shrub/scrub
 on both sides, not woods
 doing a basal area, cover type
 pretty consistent between

Point 14 300 ft below power line

R. red maple = 40

28.

Elm = 15

Green Ash = 10

Silver maple = 5

Canopy / canopy becomes more dense.

L:

red maple = 60

Silver maple = 20

Green ash = 10

only seen
coming from
ditchone dead tree w/ exfoliated bark
on either bank. Many Canadian
geese. Good canopy - complete
over head.tributary coming in at left,
shaped ditch. Significant waterFlow, drains area of silver
and red maples.Complete canopy ~~the~~
down stream of 14
many, many dead trees
standing

9

two successive tributaries
on ~~the~~ right, number in themGreat Blue Heron
Canopy extends completely
over creek ~ about 30 feet.
much standing dead wood,
hollows, exfoliated bark
many maples, elms.small groundwater flows in bank
from surrounding wetlands
canopy opens up for
about 200 yds
Saw whitetail deer drinking
from creek.Point 15 near second setof power lines we crossed today
2nd set doesn't appear on mapR: red maple = 55
Elm = 10

one standing dead tree.
many trees dbh > 16
canopy complete most of
way along

L:

red maple = 45
silver maple = 5
Elm = ~~20~~ 10
black cherry = 20

many trees dbh > 16
one standing dead tree.

0.2 miles past
point 15, canopy opens
up, only intermittent
cover past 9 feet from
either side (creek
about 30 wide)
large wetland areas on either
side of creek, many
standing dead trees.

0.7 mile past 15

31

counted 18 turkey vultures
on several adjacent
trees right by creek.

tributary on right
lots of iron in it, possibly
groundwater drainage.
large dead tree on right
100 ft further down, &
hollow, exfoliating bark

bridge → rt. 14.
canopy opens up 50 yards
before bridge, closes up
30 yards after.

Point 16

0.2 miles downstream of
RT 14.
many standing dead trees
small tributary with water
flowing in it

Sugar maple = 50

Yed maple = 10

Silver maple = 5

black cherry = 10

black walnut = 5

black willow = 5

L: elm = 5

black willow = 20

Sycamore = 10

Complete canopy closure.

For 2-300 yards on left
very open, canopy on
right continues to extend
about 9 feet

Kingfisher

0.3 mile from rt. 14 bridge,
it has significantly opened
up on both sides

after ~~3rd~~ 3rd bridge
canopy closes up again

9-12 feet either side -
just below large spillway
saw Great Blue Heron

lot of Junk automobiles
on left side

many standing dead trees
on right

and Great Blue Heron

0.4 mile from last bridge
opens up, farmland on
left. a few black willows
on right very sparse over
very large black willows
on right

tributary on left draining
wetlands

dead deer in the creek.

2 cardinals
ducks

several isolated stands of
red maple on right

tributary on left
back of road on left
propane tanks, under blocks
a stand of weeping willows
on left 100 ft long,
~~black~~ black willows on right

House on left lots of bare
soil, erosion, septic field
close to creek

Take out 11:25 AM

Big Auto graveyard + drums
on ~~Libborn Rd~~ rt 14
just before Libborn Rd,
on left side of creek.

17 skipped because no blue areas

Point 18 500 ft below
butcher rd-
P: Black walnut = 10
Elm = 10
red maple = 5

several standing dead
intermittent

small trib on left —
appears to be groundwater seep

Black + Veatch guys saw another

L: thin of red maples, then
opens up right after the
shrub/scrub, emergent
lots of willow.

not much on either side
DBH > 16

100 yards down black willows

0.3 mile below road

Large beaver dam by
island shown at map

small tributary on left
water island 2 ft wide,
only 6-8 inches of water.
drinking scrub/shrub

then tributary on right 200
ft drain. large then and
small both drinking maples
many standing dead trees
(left + right)

great Blue Heron

0.6 mile below Point 18
stretch of agricultural land on
left for 1/4 mile

~~intermittent~~ intermittent
trees + wetlands on right
duck

many standing deads,
intermittent canopy

left - ag land w/ thin strip
of trees along creek
Great Blue Heron

Point 19

becomes more heavily treed
both sides. maples

R: Elm = 10 red maple = 5
sugar maple = 30
no standing dead.

~~canopy~~ canopy thins out across 15.
complete 3 with dbh > 16.

L: strip of trees 100 ft, ~~wide~~
wide, then becomes pasture
behind.

sugar maple = 50

red maple = 35

black cherry = 5

bitternut hickory = 15

red oak = 5

one standing dead.

5 with dbh > 16

complete canopy overhanging

0.1 mile down opens up a little, but still complete canopy old concrete structure on left just past that.

50 ft down Fox scat on snag. big standing deadwood on right

~~closed~~ opened up near 344 for 200 yards then closed bank up

just before RR Bridge it opens up on both sides road along left. very close to creek ~~and~~

~~tribs.~~ small runoff tribs. large dead standing on right several Ducks

small bridge past RR bridge really opens up, no canopy at all. Big Carps road right at edge of creek

~~go~~ large tributary drain open area on left runoff from the road no trees overhanging

large oak with dead limbs on right - ~~set~~ set back from water, doesn't overhang

on left large asphalt piles several big willows on right + left back from creek.

Point 20

still very open, grass. one ~~large~~ huge black willow, ~~set~~ overhangs 30 ft, creek about 35 ft wide only tree overhanging

for 400 yards up stream,
as far as site (100 yards)
downstream.
several Ducks

200 yards further down,
dirt road to edge of
creek on right, large mound
of soil next to it, alot of
runoff, + erosion

numerous muskrat burrows
in banks

Point 20B

several dead standing on left.
all pasture, shrub / scrub
on the right, no large trees
on right.

Est;

L: black cherry = 6 trees

4m = 6 trees

1 small sugar maple

canopy overhang 5 feet
on left.

opens up again after
100 yards.
then 100 Ft further it
closes up again

Point 21

11 one standing dead trees visible
one trees either side with
doh = 16

black cherry = 90
4m = 55
Sugar maple = 10

one tree 12 Ft overhang
no other trees overhanging.
small tributary on left
trickle of water down steep bank

42

Right:

one standing dead

Black walnut = 45

box elder = 10

Locust = 5

Sycamore = 10

elm = 5

1 Tree DBH > 16

1 standing dead wood

no overhanging on the right

small willows on both sides

→ 1/1 great Blue Heron
 nests in large sycamore
 on the right

0.5 mile past point 21
 just before heron rookery,
 begin to get significant
 overhanging again

100 ft down person's yard,
 pasture field for 100 yards

opens up at power lines,
 becomes more treed on
 right afterwards, but
 stays open on left

Point 22

0.2 mile past power line
 becomes more heavily treed both
 sides

R: silver = 45

box elder = 10

no standing deadwood

5 dbh > 16

L: silver maple = 5.5

elm = 10

black cherry = 10

black willow = 5

two standing dead wood
C with DBH > 16

Intermittent overhang
both sides -

Tributary comes in on right
just below point 22 -
drains black walnut + silver maples
overhang 20 ft

Creek about 40 ft wide

about 18 inches wide,
6 inches deep

Just below that 5 standing
dead on left, large
dead black walnut on right -

Then large dead black
walnut on left

10/11/93

6:50 AM Arrived at Rt 4:
after dropping off car
downstream. Ready to go
at 7:15 AM. Waited for
B + V to get ready to
go until after 8:30 AM.

On previous day noted
slag/asphalt area along
creek at Butcher Road -

Tributary comes in on left
just below bridge, drains
road, maple area.

Just below that pipe on left
about 6 inch diameter discharging
small amount of effluent

many standing dead
1st house after bridge on right,
~~large~~ large piles of
2011 construction debris
several houses on right,
canopy completely over the
many silver maples

House on left, more houses on right,
small to buty on the right
draining ~~on~~ maple stand
on right, large dead tree
on right, hemlocks on right
many cottonwoods,
maples

predominantly maples, a
few cottonwoods + alders

many hemlocks on steep
slope on left, right in
a flood plain, some beech.

Point 23 0.8 mile below pt 45

L: red oak = 5
beech = 15
tulip poplar = 5
elm = 5
silver maple = 10
red maple = 10
one standing dead

6 with DBH > 16

Overhang about 30 ft
width of creek 50-60 ft

R:

sugar maple = 45

red oak = 10

beech = 5

slippery Elm = 5

5 trees with dbh > 16
2 standing dead & dead.
overhang 30 ft

power lines cross, 2nd
posted out drain to the
creek today. Gets to
hemlock on left,
standing dead wood on right

Motorcross track
on right

3rd turn

tributary coming in
on right, draining
stand of maples

Covered bridge small
open area right
around the bridge.

unidentified species of myrtolia
below covered bridge.

Point 24

may be
acorn
magnolia

~~about~~ 0.5 mile
below covered bridge

L: Cottonwood = 5
bitternut Hickory = 5
silver maple = 50
sycamore = 15
American Elm = 15

no standing deadwood
overhang is complete
partial

Creek 15-40 ft wide.

8 with DBH > 16

R: Hemlock = 20
Cottonwood = 5
beech = 5
River Birch = 5
Red maple = 10
White hickory = 5

0 with DBH > 16
no standing deadwood

just below Point 24 stand
dead w/ cavities.

small tributary on right,
no water in it
of for scat on rock

Tributary on right
about 0.6 mile below
covered bridge.

L: ~~maple~~

white P. P. L. = 15

Sycamore = 55

Silver maple = 20

Red maple = 5

Sugar maple = 5

overhanging complete

10 trees dbh ≥ 16

no standing deadwood visible.

R: Sugar maple = 35
A. Elm = 5

4 dbh ≥ 16

no visible standing dead.

significant flow

8-10 feet wide lots of
riffles, then ~~run~~ run
10-15 ft wobble + sand, but ~~run~~ run
for 150 yards to creek.

Point 25

just below tributary on right

R: Beech = 10
Hemlock = 10

Sugar maple = 30

Red maple = 25

Black cherry = 5

Red oak = 5

12 DBH ≥ 16

no standing dead visible

L: Beech = 25

Sycamore = 15

A. Elm = 30

Black Cherry = 5

Silver maple = 15

Linden = 5

11 DBH ≥ 16

no standing dead visible

Overhanging out as far as
25 feet over the side
creek 50-60 ft over
other side

Kingfisher just
below 25 mile
after start

2 large standing dead on left -
saw in ID'd fish

0.4 mile down from 25,
tornado damage on right
for 100 yards, large
trees snapped
200 ft down, sycamore
with several cavities
a lot of ground water
seepage

tributary on right

slag heaps in woods
on left

2nd tributary on right

~~Black cherry~~
R: Black cherry = 15
red maple = 20
Silver maple = 35

Am Elm = 10
no standing deadwood

19 with DBH > 16

Power lines cross just ~~before~~ above
point 26. Runway
opens up for 200 feet
then closes up again ~~at~~ at
point 26
overhead complete
to Portland

L: large culvert for
stream which appears
to go under track
small dirt road,
submerged railroad track

54. → other side of road.

Black cherry = 30
sugar maple = 15
Am Elm = 40
white oak = 5

1 tree DBH > 16
no standing dead wood
visible

between road + creek:

sycamore = 10
silver maple = 100
Quaking aspen = 5 cottonwood

6 DBH > 16
no standing dead visible
overhanging patrol to complete

2 houses on edge of creek
on left just before
Bridge

Arrived at take out
11:40 AM

on the water at 2:00 PM
complete coverage below
the bridge

King Fisher

Great Blue Heron

numerous houses behind
stands of trees on left
King Fisher

large dead sycamore
w/ cavities about

~~400 ft before pt 27~~

400 ft before pt 27

Point 27Just ~~above~~ power line
below

L: Silver maple = 45

Am Elm = 30

Black Cherry = 15

sugar maple = 5

bitternut, prickly = 5

7 DBH > 10

no visible standing

Partial to complete overhang
7-23 feet on left

R: white oak = 5

Hemlocks = 35

sugar maple = 20

red maple = 10

Sycamore = 5

Black Cherry = 5

~~6~~ ~~catbark~~~~1~~~~1~~~~1~~

hippy Elm = 5

beech = 25

10 DBH > 10

No visible standing Dead

copy 8-20 ft

rock width 60 feet

copy complete

Just ~~below~~ below point 27Walk down large standing
decree, ex fol bark
brightand further small
ex stand deadbad winged hawk
1 hour

below power line
hemlocks, flat top hick,
more sycamores
and a few black willows

open area on right
for 200 ft +

tributary on right
standing dead on right

45 ft wide 4 meter deep
pool as deep as

example = 40
black cherry = 20
silver maple = 20
all the way around both
sides, can't get
out, private property.

pool as deep as 18 inches
tributary is about
700 ft above
furnace road

2 standing dead on
right just above
furnace road.
opens up for 100 ft
around bridge

Point 28

L. silver maple = 40
sycamore = 20
black cherry = 15

B D 11 > 1/6
mostly dead
Hemlock just
above bridge, guys.

6C

in truck stopped &
watched for long time

R = Sugar maple = 15
black cherry = 10
red maple = 10
sycamore = 10
silver maple = 10

9 trees abn 16
no standing dead

canopy overhanging plate

2 large trees
standing dead w/ ext
work on left
100 ft below

point 28
bank on left steeper
with numerous knalocks

50 ft below pt. 28
Hye dead standing
hemlock 50 ft
down on right.

After Immediate after
that ~~from road to~~
Creek widens to
80 ft, complete
to ~~the~~ Inter hill for
dividing. wet land with

large dead tree on
right, exfoliating on

50 yds, seemed
small silver, sugar maple
10 ft Blue Heron
many trees
ABH = 10

Some houses both sides
near spillway canopy
becomes more
intermittent
kingfisher.

discharge pipe (40 in
diameter) by footbridge
on right.

Ed says take out
12" well cultivated
park like setting
about 200 yds long
behind are sycamores
and sugar maples, hickory
tulip poplars

spillway

walking right bank
Several large standing
dead wood leaning
trees dbh = 4

Point 29

200 ft below spillway

R = sugar maple = 40
red oak = 5
sycamore = 10
tulip poplar = 15
elm = 5
silver maple = 10

17 dbh > 16

overhang = 25 ft

L = overhang 22 ft
Creek about 50 ft wide

sycamore = 45
red oak = 10
black cherry = 5
sugar maple = 25
silver maple = 10
hickory sp? = 5

64

Cottonwood = ~~10~~ 10

12 trees DBH ≥ 16
 no standing dead visible

downy crotch under
 bridge on left.

2nd small downy on
 left side of bridge

750 ft below bridge,
 park like area on
 left, a few dead trees
 maple & sycamore
 right continues to
 have silver maple
 overstory w/ silver
 maples & sycamore

~~extended~~
 park on left extends
 to 1400 ft past
 bridge, then Point 30

Point 30

L: Overhanging becomes
 about 20 feet with
 honey locust = 20
 red maple = 15
 silver maple = 15

10 trees DBH ≥ 16
 grand haw burrows

Large standing dead
 with crotch on right
 bank

Point 31
 2100 ft below r + 300 ft
 a few scattered trees on
 left

L: silver maple = 25
 black willow = 30
 Honey locust = 25
 overhanging to 25 ft

DBH ≥ 16 no
 understory, well known

100 ft above next
 bridge sewage/stormwater
 effluent pipe discharging
 on left string
 [sewage smell.
 State Route 164
 racoon scat under bridge
 on right
Point 32
 just above Rt. 164:

R: 2 DBH > 16 no stand dead
 black willow = 10
 silver maple = ~~10~~ 20
 Elm = ~~10~~ 10
 29 ft overhang

L: silver maple = 35
 black willow = 10
 1 DBH > 16, thin
 lines of trees w/ bases
 behind overhang = 12
 no standing dead visible.

Railroad bridge
 right bank of RR bridge
 for 100 ft is all
 concrete and gravel.
 racoon tracks under
 RR bridge.

no significant trees
 on left all the way
 down to next road

R: significant forest
 cover begins below
 concrete gravel bot- of
 Kilm.

steep banks on right
~~large old trees~~

68

Point 33

across from sand +
gravel place 500 ft up
from road.

R: Cottonwood = 15

Am Elm = 10

Slip Elm = 5

Red oak = 10

black cherry = 5

3 standing deadwood

5 DBH > 16

canopy overhang to 20 ft

R: Large 2 ft diameter
drainage pipe from
sand & gravel business,
significant effluent

large oil tanks +
drums on property
large earth moving machinery

69

COVER ends by road on
right, begins again after
road → Market street

Ed says Petroleum Smell
on left (I can't smell
it, Ed has cold but
thinks it's only
in chest)

Lisbon Thrush and
Albino Towhee
just above
market, road bird
on right.

Point Source I.D.

Gas

1. Pipeline Station upstream of wastewater treatment Plant. Creek is Really small

0.4 mi

2. Southeast of Route 45 overpass over PA Avenue
 - is Worthington Custom Plastics
 - is backed up to ephemeral
 - Portion of MFLBC upstream of Pipeline Station
 - lots of Free standing chemical Tanks

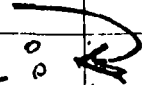
3. Industrial Park North of the MFLBC Downstream of the Route 62 across Road Salem Parkway:
 - Cardinal pumps + exchangers
 - Redex Industries (lots of drums + tank)
 - Lowery Tool and Die

→ Salem Industrial Park

72

Beechwood Road:
Numerous houses, ~~ag~~
a few agricultural fields.

Gosken Road.

Trailer Park: 
waste water off vent
Colonial Villa

across creek from Trailer
Park, gas. pumping
tank + station

Rt 165 near creek -> G.I.F
construction place, heavy machinery
200 yards from creek
200 yards other side of creek,
another gas pumping
station for pipeline.

Intersection of 165 and 45
small airport + Salem air park

73

North on rt 45
passed creek, mixed resident
and agricultural around creek

Turned onto
Middletown Road.

at rt 62 + Middletown
old petroleum tank
and inactive oil pump.
on both banks.

agricultural fields east of
creek between rt 62 and
165 -> corn fields.
west of power lines is wet

⊗ Cardinal Mining on rt
potential runoff.

Note: Goodman Ditch
does not flow into
MFLBC.

74

Special Note for Ed:

Goodman Ditch where
it crosses Co. 2 is only 2 feet
~~wide~~ wide, 2-3 inches
deep, then opens up in
big wetland used as pasture,
creek is excessively
nutrient loaded along
Calla Road. completely
algae covered creek.

On Rt 14 just before
Lisbon road, mining
operation on left,
auto graveyard on right

along Lisbon road, heavily
forested, a few houses

drive down Lisbon road
road

Bob + Dore

In Lisbon end of grain
street large Auto
Junkyard near creek,
~~pot~~ potential point source

End of Jefferson Street
near creek Hayes Oil
company. ~~55~~ 55 gal/m.
barrels, loading area.

near crossing of creek with
rt 30 and 45 in Lisbon
Ashland Gas Station (Lust.)
Rusted metal tanks behind
station.

Sewage treatment
plant on east side of
town near creek.

rt 154 just east of town,
gravel operation on right
side of road near creek.